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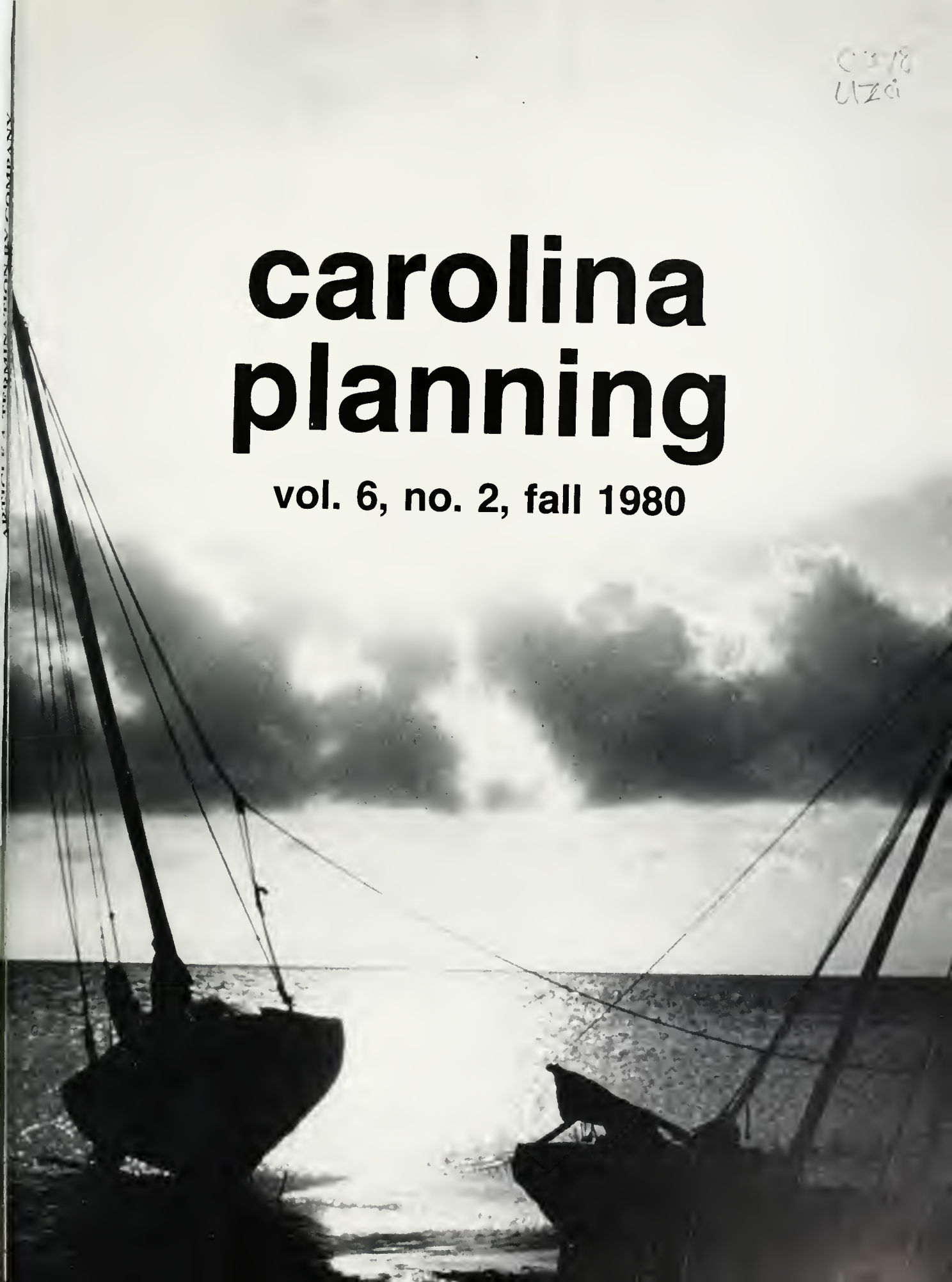

Introduction

During this Year of the Coast, we would like to add our voice to those making the plea for increased awareness and appreciation of our coastal resources, and the problems inherent in using and preserving those resources.

Our coastal area wealth, measured both in terms of aesthetics and use value, is under increasing pressure from development. As planners we need to appraise the situation and wisely review any proposal for development in order to gain the maximum benefits for those using the beach. Pressures of tourism, second home development, vehicular traffic, and energy demands need not be dismissed as incompatible with beach recreation, but incorporated into a careful strategy for beach development.

Included in this issue are articles which point out the conflict between the natural forces of the coastal ecosystem and the development pressures on that system. Articles by Todd Miller and Neil Caudle look at the problem from the perspective of the long-time coastal resident. Todd describes the influx of second home builders on Ocracoke Island while Neil takes a look at threats to the fishing and boat-building industries on Harkers Island.

Brian Benson and David Owens illustrate the planning processes and inherent conflicts in coastal planning in case studies of Aurora, North Carolina and Currituck County, North Carolina, respectively. A piece by Lawrence Zucchino looks at designing developments on barrier islands, while Paul Hosier studies the effects of off-road vehicular traffic on beaches. Barrie Stokes reviews the latest revisions to the Coastal Zone Management Act, and Robert Ansley interviews Orrin Pilkey to discuss Pilkey's concern over development on the dynamic coastline.

We wish to extend our thanks to Dr. Albert Hine, Professor of Geology at the University of South Florida in St. Petersburg, and Professor David Brower, a lawyer and planner at the Center for Urban and Regional Planning at the University of North Carolina in Chapel Hill. Both contributed to our content through their knowledge of the coastal system and of others, researching and planning for that system.

As always, we invite readers to respond to our content and design and to submit manuscripts for publication in future issues. Thank you for your continued support of our efforts.

Forrest Sadler
Kathy Blaha

carolina planning

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As we complete our sixth year of publication we find an increased demand for a regional publication serving the southeast. Your comments, subscriptions, and manuscripts are needed in order for us to begin to enlarge our base to reflect the region's diversity.

carolina planning welcomes submissions and responses to content. Article-length manuscripts should be typed a maximum of twenty pages, double-spaced; *carolina forum* pieces, on interesting activities or planning issues, should be a maximum of seven pages. Letters to the Editor will vary accordingly.

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carolina forum

Beach Houses And Shifting Sands
An Interview With Dr. Orrin H. Pilkey

One of the burning issues of coastal planning today is the subject of beach development. On one side are those who feel development is inevitable yet manageable through actions taken to alter the beach and protect the structures: protection of development is paramount. On the other side are those who feel beach preservation is the overriding concern. Their argument centers on the fact that actions taken to save the structures will only result in damage to the shoreline. They advocate beach development that recognizes the inevitable dynamism of the coastal ecosystem and does not interfere with that process. This, however, translates into development that is very different in concept and value from traditional notions of property ownership and enjoyment.

In the thick of the controversy is Dr. Orrin H. Pilkey, who has been called "the man who wants to let the lighthouse fall in." His view, simply put, is that the beach is a dynamic system that will run its course regardless of what man does to change it. Whatever intrusion man makes into the system in order to save it is doomed; in the long run he will cause more harm that he tried to prevent.

Dr. Pilkey's concern for beach preservation is explained at length in his 1979 book, *The Beaches Are Moving*, co-authored by Wallace Kaufman. It is the culmination of his many years as a passionate observer of coastal change and as Professor of Marine Geology at Duke University. Dr. Pilkey is also president-elect of the North Carolina Academy of Sciences.

carolina planning: Your most recent book is entitled *The Beaches Are Moving*; just what do you mean by this?

Pilkey: The title refers to the fact that we have a worldwide sea level rise going on now caused by the melting of the polar icecaps, and, as a consequence, beaches everywhere are moving back. The beach is a dynamic system. Even if the sea level weren't rising, the beach would be moving back and forth in place, changing its shape. When the beaches move, property is lost as the sand is taken here and added there, just as inland erosion moves soil from one ecosystem to another, from field to river or swamp, or from swamp to ocean. The moving sand of the beaches stays in the beach system or is replaced by sand arriving from fresh sources. The beach ecosystem, under natural conditions, does not lose any vital material; it merely moves and survives, so long as man does not get in the way of that movement.

c p: You have said that compatible beach development requires a drastic reorientation of how people view their houses; that instead of representing permanent capital assets, houses should be built as more or less inexpensive, disposable shelters which will not stand in the way of natural forces. Please elaborate on this.

Pilkey: The fundamental damage caused by development on islands comes when people try to protect their houses by building seawalls, jetties, and groins, or by pumping sand. So just building a big expensive house, if it is built on pilings, won't necessarily do fundamental damage to the island. The problem is that the type of person who will build a million dollar house on a beach is also the type of person who will insist upon, and who is powerful enough politically to get, engineering structures put in front of his house. And engineering structures, which are called stabilizing structures, will *always* destroy the

beach in the long run. If the beach is deemed worthy of preservation, then it becomes politically essential to keep the million dollar house off the beach. If I thought it were possible for million dollar homeowners to let their houses fall in and be good sports about it, I wouldn't suggest that we should have cheaper housing. So, it is for political and economic reasons that I suggest we should allow only cheap housing on the beaches -- housing that will be allowed to fall in when its time comes; housing nobody will spend a great deal of political effort on in trying to save, because it is the saving of that house that will destroy the beach. As an example, I have seen small beach communities where the houses were cheaply built and some of them were even built on skids so they could simply be pulled back as the shoreline advanced with the rising sea level.

The best example of the problem is when Hurricane David came by and removed a lot of the beach in front of Sea Island, Georgia. Sea Island has some very, very wealthy people, and in spite of all the urging to the contrary, a massive seawall has just been built. And a massive seawall will destroy the beach. But these people are the captains of American industry, and there's no way the state of Georgia is going to tell them not to build a seawall, or in other words, tell them "it's time for your house to fall in."

c p: The co-author of *The Beaches Are Moving* is Wallace Kaufman, a North Carolina realtor and developer. Where does the private development sector fit into your scheme for beach preservation?

Pilkey: Oh, we admit to the desirability of development on barrier islands under certain circumstances. The purpose of the book was not to explain the folly of all development on barrier islands, but rather to explain the folly of the present type of development and to explain the long range effect of what's being done. More than anything, we try to emphasize the long range -- the fifty to 100 year effect which is a very difficult thing for people to visualize. Private developers possibly can see ahead ten years -- the more enlightened of them -- and maybe I can't blame them for not looking beyond that, but we're trying to get people to look beyond that ten years and see what's down the road for them if they build right next to the beach or build jetties on inlets.

c p: How and where can development exist on the beach?

Pilkey: There are two ways of looking at this. If you're willing to take the chance of letting your house fall in and are willing not to stabilize, then development could take place virtually any place on a barrier island. But, in reality, if one wants a house to last long enough for their grandchildren to take advantage of it, and if one does not want to be part of the political system that will eventually destroy the beach, as we see in all of our old, developed islands, one generally should build on the back side of barrier islands, in maritime forests, or at high elevations. One must be a little careful though, because some of North Carolina's islands are eroding on the backside even faster than they are on the front side. Much of the data regarding erosion rates of beaches are available in most coastal states to potential homebuilders. The main considerations are 1) potential destruction from a storm, and 2) shoreline erosion caused by the sea level rise. *No* place on a barrier island is safe, but there are many places, for example on the Outer Banks of North Carolina, where people have lived for over 100 years. This is because the early settlers were no-nonsense people who were out there

Orrin H. Pilkey *Photo by Conrad Neumann*

fishing or keeping away from the law, and they weren't there for the sea-view. They were very concerned about the safety of their homes, so they built in very safe places.

c p: So what you are saying is that the existence of a structure on a beach is not the problem; it's what you do to preserve the structure.

Pilkey: That's right. The existence of a structure is *not* the fundamental problem. It is only the political potential of that house that is a danger to the island.

c p: At what point does the destruction of beaches and the shoreline become irreversible?

Pilkey: That's a good question. It hasn't been studied, but one can see irreversible damage on the northern New Jersey shoreline: Monmouth Beach, Sea Bright, Long Branch. These are places where, because of the reflection of waves from seawalls and similar structures, the shore face is so steep that there is no way sand can be pumped back there in an economic fashion -- it would disappear quickly. So the only thing these communities have to look forward to in the future is building bigger and better seawalls. At what point it becomes irreversible is not really known; as a 'guesstimate' I would say within thirty years after the placement of a seawall and similar structures the situation probably becomes irreversible on most barrier islands.

What we have to study is how we can reverse these irreversible trends. In the New Jersey and south Florida situations, for example, can we bulldoze down those seawalls, get rid of the houses and motels on the front side of the island, and allow nature to roll on? This is a total unknown at the present time. Sea Bright, New Jersey, is an example I like to talk about, where I would guess the island is 100 yards wide. I suspect that if the island had gone its natural way, it would be 200 yards behind where it is right now.

c p: How would you evaluate the federal government's performance with respect to coastal preservation, and do you see it taking a more aggressive role in the area?

Pilkey: The need for additional protection, so to speak, of the coastal areas is manifested right now in the bill that's going through Congress, the Burton Bill, which is a barrier island bill, and looks as if it has some chance of passing. The bill is an incredibly strong bill, as it is presently written, that will basically take the federal government off the barrier islands, and it will preserve areas that are not now developed. The federal government has finally stepped back and taken a big look at the cost of barrier island development, and discovered the long-range cost is just overwhelming. For example, the flood insurance program and other things such as bridges, sewers, water, roads, and so forth cost a lot of money. If the federal government were to step off the islands, development would halt *instantly* -- so fast your head would be swimming, there's no question about it. The federal government has recognized this, and whether this Burton Bill will make it through or not, or whether there will be another bill two years from now, there's no question in my mind that barrier island development, at least the federal role in it, is going to be considerably diminished, which is the way it should be.

c p: Isn't the rationale for the Burton Bill based on the idea that buying the islands now is much cheaper than in the long run?

Pilkey: That's right. Buy them now before we have to buy them many times over when we put in our stabilization, pay for the houses when they fall in, and provide disaster relief when the storms come. Not only is it necessary for planners to be able to consider the long-range environmental effects of development on barrier islands, but planners must also be able to understand and visualize the long-range economic effects of shoreline stabilization. There is good evidence that over a period of years the cost of shoreline stabilization to the public pocket, either through taxpayers or private individuals, far exceeds the value of the property that's being saved. Under these circumstances one wonders why we continue to stabilize. The problem is that we continue to look at this problem from a short-range viewpoint. From a ten- or twenty-year viewpoint the economics look very good -- it's

worth saving these houses; the houses are worth three million dollars and it's only going to cost a million and a half dollars to "save them." But then ten years later, you have to save them once again, and then ten years after that, you save them once again, and meanwhile it gets more expensive to save them. One example of the cost of this is the new beach in Miami Beach. It costs 67 million dollars to put in fifteen miles of beach, and that fifteen miles of beach could disappear in a single storm. Chances are it will disappear very rapidly; I would expect it will be gone in ten or fifteen years -- it's a difficult thing to predict at this stage of the game but probably in ten or fifteen years that 67 million dollar beach will be gone and then they will have to pump another one, all at taxpayer expense. The question is whether it's worth it. Of course Miami Beach has a lot of big buildings that one can put up economic justification for, but how about Wrightsville Beach in North Carolina? Wrightsville Beach is not a community like Miami Beach, and we've spent several million dollars there on replenishment.

c p: Replenishment is often the compromise solution reached when attempting to satisfy both the persistence of a beach system, and the pressures of development. How do you feel about coastal zone management?

Pilkey: Coastal zone management is really the only hope for our barrier islands. The system just will not work without some overseer. We can see this already on our old, developed islands. For example, look at the communities of Wrightsville and Carolina Beach in North Carolina. They refuse to learn the lessons of New Jersey and are doing exactly the same kind of thing the people of New Jersey did 100 years ago. Every community develops in a vacuum; maybe this is a fact of life that planners know about but I didn't know about it, so it has come as a surprise to me that the lessons of New Jersey and southern Florida have had no bearing on the development of North Carolina.

Another thing that I have learned that perhaps planners knew long ago is that many times there is a lot of rhetoric among government officials, planners, and scientists. I used

Photo by Ocracoke Photographer, Ann Ehringhaus

to think that such noise meant that progress was being made, but it turns out that the developers and realtors are often just plowing right along doing things just as they did thirty years ago, in spite of all our so-called increased knowledge, understanding, sensitivity, and so forth.

c p: You have said that beach erosion to an engineer is beach migration to a marine geologist. How can planners best overcome the problems caused by these differing perspectives?

Pilkey: That's an incredibly difficult problem. If I knew the answer to that I could solve the American shoreline problem. I think a major problem that we have in developing the American shoreline in a sensible way is the conflict between geologists and engineers -- their difference in outlook. There are many engineers who still do not admit the sea level is rising, and yet almost all geologists think the main cause of the shoreline erosion problem is the sea

level rise. Of course looking at it from even a broader viewpoint, we don't really look at it as beach erosion, we think it's island migration. In fact, we're sure it's island migration. Islands are migrating back toward the mainland and the mainland is eroding at the same time. Well, if we're so far apart that we can't even agree on what the main problem of shoreline erosion is, then there is no way we can possibly solve this problem.

The geologists' basic contention is that 1) the sea level is rising, 2) it is the main cause of shoreline erosion, 3) everything the engineers do is designed toward stabilization, or stopping the island migration. In other words, they do nothing to respond to the sea level rise. All of the alternatives by which one could respond to the sea level rise are indeed painful because they involve having to let the island move -- no question about that. So houses have to fall in and politicians do not like to talk about that. But houses do not really have to fall in; they can be moved, they can be purchased, there are other alternatives, too. There are three possible solutions that I can think of that respond to the sea level rise. One is do nothing and let the houses fall in when the time comes or some modification of that. Two would be the so-called Fire Island solution: don't pump sand on the front side of the island, but instead pump sand on the back side of the island; in other words, migrate it artificially. Three, an idea given to me by Jay Langfelder, an engineer at North Carolina State University, use minimum standards of shoreline engineering structures. That is, allow people to build a seawall; but it would have to be made out of biodegradable materials like wood, and it would have to be very weak. The seawall might survive the five-year storm but it shouldn't survive the ten-year storm. This stabilization would not be permanent and would not 'New Jersey-ize' the island.

c p: What would you say are the proper roles and strategies for coastal planners?

Pilkey: In my view as a geologist, survival of our islands hinges exclusively on keeping the engineer off the island, period. I really can't give planners specific instructions or suggestions other than to say that they must urge that houses should not be built where they will fall in some day, and of course, that's very difficult in view of the fact that most of our islands in North Carolina are eroding on the front side three to six feet a year. Somehow, in planning, planners must designate zones on the front side and sometimes on the back side of the beach where the houses will someday fall in or will someday have to be moved. I don't know how a planner can do that, but under no circumstance should we continue to have permanent development of an expensive nature close to the beach. That is the most disastrous type of development one can have in terms of the long-range future of that island.

c p: So, you're suggesting that planners should tailor land use and development regulations to generate these outcomes.

Pilkey: Right -- exactly. Again, since I'm not a planner, I don't understand how this is done, but it's a matter of somehow getting the regulations into the community or the development that will allow for long-range survival of the system. And I would also urge planners to expand our horizons far beyond that of a politician or a developer. A developer can see to the end of development, a politician can see until the next election, and I think planners somehow have to get a fifty-year vision; I would urge all planners of coastal barrier islands to visit New Jersey.

In a vivid example of the dilemma between beach preservation and shoreline stabilization, the National Park Service has decided to build an underground wall to temporarily protect the Cape Hatteras Lighthouse from erosion caused by the Atlantic Ocean. Only seventy feet of beach remains between the lighthouse and the ocean and it is not expected to last through the winter. Although the Park Service has a policy of letting nature take its course on the shoreline, this stopgap measure will give it time to decide what permanent measures -- if any -- will be taken to protect the lighthouse. The proposals include doing nothing, moving the lighthouse, and erecting more permanent barriers. A spokesman said the Service will weigh the costs and benefits of tampering with nature against saving a piece of history.

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North Carolina Nature Conservancy
Conservation Through Private Action

Until about four years ago, few people in North Carolina had ever heard of Carrot Island and Bird Shoal with the exception of Beaufort and Carteret County residents, naturalists, and those connected with the adjacent Duke University Marine Laboratory. Carrot Island and Bird Shoal, located directly across Taylors Creek from Beaufort's historic Front Street, have traditionally served as open space for the area's townspeople. Yet it took the threat of development and the publicity that followed for most people to realize just how special this area really is. Much earlier, in fact, this island complex served as an inspiration for Rachel Carson's first book, *The Edge of the Sea*. In 1949, Ms. Carson spent her summer walking the tidal flats and warm sand of this 474-acre island complex and wrote of the beauty and uniqueness she found there:

> ...to visit Bird Shoal, one goes out by boat through channels winding through the town marsh of Beaufort and comes ashore on a realm of sand held firm by the deep roots of beach grasses, the landward border of the shoal. The burrows of thousands of fiddler crabs rule the muddy beach on the side facing the marshes. The crabs shuffle across the flats at the approach of an intruder and the sound of many small chitinous feet is like the crackling of paper. Crossing the ridge of sand, one looks out over the shoal. If the tide still has an hour or two to fall to its ebb, one sees only a sheet of water shimmering in the sun.

Early in 1976, Beaufort residents unexpectedly discovered that a private developer had purchased a portion of Carrot Island and Bird Shoal and intended to auction it off in five- and ten-acre parcels. A large portion of this property was under county jurisdiction, had no zoning designation, and could therefore be sold immediately without complying with any subdivision ordinance requirements.

Over a hundred individuals from Beaufort and Carteret Counties formed the Beaufort Land Conservancy Council to voice their opposition and initiate a fundraising drive to purchase the island. Through small donations and with the help of substantial contributions from three local industries, the Council was able to raise $85,000 towards acquisition. In need of additional funds equaling three times that amount, the group turned to the North Carolina Nature Conservancy, a non-profit conservation organization, for help in acquiring the property.

The North Carolina Nature Conservancy was keenly interested in the preservation of the area because of the Carrot Island complex's long-standing importance as a special nesting place for sea and marsh birds. After lengthy negotiations with the developer, the Conservancy obtained an option on the property far below the asking price by offering tax incentives and a cash purchase. The Conservancy's purchasing power through a national revolving fund enabled it to move quickly. This, combined with contributions raised by the Beaufort Land Conservation Council, secured the property. The Conservancy will be repaid through an in-state fundraising campaign by Duke University and, upon completion, the University will retain title to the island. With a recently established Stewardship Committee comprised of local residents, representatives from the Duke University Marine Lab, and naturalists and scientists, a management plan will be developed for these islands to guide their future preservation. Acquisition of ecologically important property, its protection and stewardship, and education are the primary goals of the North Carolina Nature Conservancy. As a state chapter of the National Nature Conservancy, the North Carolina Nature Conservancy is committed to the preservation of natural diversity through the protection of lands containing the best components of our natural heritage. To date, the Conservancy and its members have been responsible for the protection of over 100,000 acres of North Carolina's forests, marshes, mountains, swamps, and islands such as Carrot Island and Bird Shoal.

The North Carolina Nature Conservancy first opened its doors in Chapel Hill in 1977. Today it has grown to over 2,000 members statewide, developed a substantial network of volunteer consultants, and is staffed by four full-time professionals. The Conservancy is a publicly-supported, non-profit, tax-exempt, scientific and educational organization governed by an elected Board of Trustees. Often referred to as the real estate arm of the conservation movement, the Conservancy retains and manages certain acquisitions while transferring others, when appropriate, to local, state, and federal agencies. Activities of the Conservancy are made possible through contributions, foundation grants, and membership dues.

Over the course of four years the Conservancy has made substantial contributions toward the preservation of North Carolina's coast as well as other areas of the state. Since its inception, the Conservancy has successfully preserved eight of the ten most ecologically

significant areas in North Carolina. Areas of significance are usually identified by the North Carolina Natural Heritage Program, a Natural Areas Inventory which began as a cooperative venture between the Conservancy and state government, and is now administered through the North Carolina Department of Natural Resources and Community Development. The Natural Areas Inventory is a cumulative process of identifying critical habitats' and species' occurrence throughout the state. This information is available for the preparation of environmental impact assessments, and the planning of commercial and residential development. Use of this information by planners, developers, and other decision-makers often alleviate adverse impacts on the environment.

Photo by Fred Annand

Two of the Conservancy's earliest projects are in the coastal county of Brunswick. A gift of 11,000 acres of marsh and high ground on Bald and Smith Islands from the Baldhead Island Development Corporation was later transferred to the State and incorporated into the North Carolina Park System. A management plan is currently being drafted by the Conservancy for another gift of 13,850 acres from the Federal Paper Board Corporation in the Green Swamp. This area provides habitat for a variety of important species such as: black bear, the American alligator, the bald eagle, Venus' flytrap, and that once abundant but rapidly disappearing feature in North Carolina, the pocosin.

Early in 1978, the Conservancy received one of the largest single grants in history ever given to a private conservation organization. The R.K. Mellon Foundation contributed $4 million toward acquisition and protection of two key tracts on the Currituck Outer Banks in Currituck County known as Monkey and Swan Islands. Totaling 6,806 acres of shoals, freshwater marsh, islands, and 2.5 miles of ocean-front property, this single acquisition includes one of the finest expanses of undeveloped beach on the Atlantic Coast, as well as critical feeding grounds for migratory waterfowl along the Eastern flyway. This purchase also included conservation easements on 4,500 acres freshwater marsh from the Swan Island Hunting Club, over which the Club will retain title.

Never has there been an ecological issue in the state of North Carolina that demands the degree of cooperation between federal, state, and local governments as does the future of the Currituck Outer Banks. The U.S. Fish and Wildlife Service is attempting to create a wildlife refuge in the area that will extend from the Virginia border south to the Village of Corolla, including all marsh lands south of Corolla to Dare County. There is enormous pressure to develop this area for second homes and consequently, environmental problems such as sewage disposal, alteration of the barrier islands, and disruption of wildlife habitats are preeminent.

Perhaps the most significant unprotected natural area on the coast, Nags Head Woods, represents the ultimate challenge and success of the North Carolina Nature Conservancy to date. Totalling 1,860 acres, this ancient maritime forest and freshwater pond system spans the shoreline from Roanoke Sound southward to Jockey's Ridge State Park. One of the eight National Natural Landmarks in North Carolina, Nags Head Woods is the Conservancy's most important and complex project to date. Believed to be of national importance in terms of biological diversity, Nags Head Woods claims thirteen bird and five plant species considered rare and endangered in the state, as well as seventeen additional species of plants listed by the Cape Hatteras National Seashore Park as being rare or endangered on the Outer Banks.

Private contributions in excess of $735,000 have made it possible for the North Carolina Nature Conservancy to pursue its preservation goals at Nags Head Woods. Having identified a core area of 300 acres, considered to be the most critical from a preservation standpoint, the Conservancy has successfully acquired 255 acres through the use of a wide range of acquisition techniques. With the Conservancy's tax-exempt status under Section 501(c)(3) of the Internal Revenue Code, methods such as gifts of land, bargain sales, and conservation easements become useful tools in the protection of land. Beginning with an initial gift of 30 acres in Nags Head Woods, the Conservancy has acquired an additional 225 acres by utilizing these acquisition methods coupled with rights of first refusal and fee simple purchase.

While the Conservancy continues to work toward completion of this nature sanctuary, planning has become of the utmost importance. A Stewardship Committee headed by Dr. Albert E. Radford, professor of botany at the University of North Carolina at Chapel Hill, is charged with determining the management and future educational and scientific uses of the preserve.

The Town of Nags Head is also a major land-owner in the area and has recently applied for a Coastal Area Management Act Grant to compile and implement a Master Land Use Plan for its and the Conservancy's holdings in Nags Head Woods. The Master Plan will analyze the present use patterns, determine the effects of these activities on the fragile nature of the area, and draft regulations to enforce appropriate future uses. Upon completion of the plan, it will be the Conservancy's policy to permit the maximum public utilization of its sanctuaries consistent with preserving the essential natural character of the sites.

The North Carolina Nature Conservancy is committed to the protection of our State's natural heritage not only along the coast, but also in the Piedmont and mountain regions. With successful projects such as Roan and Yellow Mountains in Avery County and Bluff Mountain in Ashe County, the Conservancy fully intends to continue its conservation efforts in the State. Two important current projects are the leasing of Bat Cave, a National Natural Landmark in Rutherford County, and the acquisition of conservation easements for over 2,000 acres at Rainbow Springs on the Nantahala River. The Conservancy will also investigate, in the near future, the use of local land trusts in various areas of the state to protect and monitor smaller natural areas.

While the Conservancy has accomplished a great deal, a tremendous challenge remains in the area of land conservation in North Carolina. Planners, both in the public and private sectors, are capable of making an enormous impact on the future of preservation. The Natural Heritage Program, with the use of computerized data, can provide planners with invaluable information on areas of ecological significance. Sound planning coupled with public awareness will enable North Carolina to continue protecting its natural heritage for our benefit as well as for the benefit of generations to come.

Frederick W. Annand
Assistant Director
North Carolina Nature Conservancy

The North Carolina Nature Conservancy seeks support for its operations through volunteers, memberships, and contributions. For further information please contact: The North Carolina Nature Conservancy; P.O. Box 805; Chapel Hill, NC 27514.

Congress Revises Coastal Zone Management Act

On October 1, 1980, Congress cleared and sent to the President the final bill HR 6979 containing a package of significant amendments to the Coastal Zone Management Act of 1972. The intended impact of the bill, according to the report of the full Committee on Merchant Marine and Fisheries, was to strengthen the Act; moreover, the bill aimed to signal to the States a continued commitment on the part of Congress to a program of support for states managing the valuable resources of the coastal areas.

The bill also reauthorized the Coastal Zone Management Act of 1972 (CZMA) for five more years, an action meant as an incentive to those states not involved in a CZMA program to participate in the voluntary coastal management program. The Committee deemed this step particularly timely, since 1980 has been designated and presidentially-endorsed as the "Year of the Coast" -- a designation intended to refocus national attention upon the increasingly complex problem of carefully developing yet preserving coastal resources.

Final bill HR 6979 was a compromise between the original bill offered by the House Merchant Marine and Fisheries Committee and a bill passed by the Senate on June 3, 1980. According to the *Congressional Quarterly*, the compromise, as passed reduced existing authorizations for coastal planning grants by $75 million. However, new State grant programs were established to revitalize urban waterfronts and to ameliorate adverse environmental effects associa increased coal trans-shipment and alternative energy development. Though the original House Bill offered a total of $848 million over an eight year period, the bill as cleared authorized $805 million over a five year period. Of that amount $240 million will be apportioned among the 25 states that voluntarily participate in the basic Coastal Zone Management program.

OVERVIEW OF KEY PROVISIONS OF HR 6979

A sweeping glance at the key provisions of these newly enacted amendments to CZMA indicates a shift from the development phase of the CZMA program to an implementation and enforcement phase of state management efforts. For example,

former Section 303 of the Coastal Zone Management Act embodied a general, rather vague declaration of the national policy behind the Act. The section provided very little guidance concerning the objectives to be achieved by the States under a CZMA program.

The new, amended § 303 expands the original policies to include a list of eight more specific national policies for which state management programs should provide. These national policies include protection of natural resources within the coastal zone, minimization of loss of life and property caused by improper development and destruction of dunes and barrier islands, and provision of public access to the coasts for recreational purposes. Another national objective is to give priority consideration to coastal-dependent uses and orderly processes for siting major facilities related to fisheries development, energy, recreation, national defense, and transportation. Moreover, states should, "to the maximum extent practicable," locate new commercial and industrial developments in areas where development already exists. Finally, amended Section 303 also encourages, as national policy, the participation and cooperation of federal agencies, state and local governments, and other regional agencies in carrying out the purposes of the Coastal Zone Management Act.

House Bill 6979, as passed, significantly altered the procedure set out in § 306 of the CZMA for awarding an administrative grant to a state. Specifically, the Secretary of Commerce must now find, prior to awarding a grant, that the coastal state will spend an increasing proportion (up to 30 per cent) of each grant received on improving the state's achievement of the § 303 objectives. This provision is modeled after a demonstration effort instituted by the National Oceanic and Atmospheric Administration (NOAA), which has targeted 20 per cent of federal administrative grants in fiscal years 1979 and 1980 for selected issues of national concern. The apparent purpose of this procedural change is to ensure a balance of expenditures to meet national needs as well as state needs.

A further amendment to § 306 of the CZMA encourages, but does not require, states to designate coastal resources of national significance and to establish standards for their protection. The committee comments to HR 6979 point out that a desirable feature of the Coastal Zone Management program is that participation by the states has been purely voluntary in the past. To continue the voluntary nature of state involvement, no provision has been made for federal intervention when states choose not to designate coastal resources of national significance.

RESOURCE MANAGEMENT

A brand new section added to the Coastal Zone Management Act is § 306 A, entitled "Resource Management Improvement Grants."

Actually, the new section consolidates portions of existing law and expands the use of authorized funds to enhance implementation of state management programs.

Section 306 A sets up state grants to implement three objectives:

a) Preservation or restoration of natural resource areas,

b) Revitalization of urban waterfront and port redevelopment, and

c) Provision of greater public access to coastal areas.

The funds for these activities were limited under the bill as initially proposed, but funds were slashed even further under the compromise bill as passed. The bill originally reported out of the House Merchant Marine and Fisheries Committee provided $35 million for these 306 A projects; the compromise authorized only $20 million. Moreover, to be eligible for the grants, a coastal state must have an approved management program and must show "satisfactory progress" in achieving the national coastal objectives of the Coastal Zone Management Act.

Unlike the earlier, less structured orientation of the CZMA, Section 306 A provides funds with specific results expected. The amendment describes in some detail the type of expenditures allowable to achieve the goals listed in the amendment. For example, the amendment suggests small-scale construction projects such as paths, walkways, bridges, parks, and the rehabilitation of historic structures. To revitalize urban waterfronts and ports, the amendments authorize the rehabilitation or acquisition of piers, or the installation of bulkheads as permissible expenditures. The authors of the amendment apparently felt that this specificity would better enable states to enhance the effectiveness of their management programs.

A new addition to § 308 of CZMA grants limited federal funds to states detrimentally affected by increased coal trans-shipment or alternate ocean energy development. This section is expected to affect particularly the coastal zone of the Great Lakes region, which already is experiencing adverse environmental effects from increased coal trans-shipment. Some of these undesirable effects include accelerated erosion, increased dredging and dredge disposal problems, and decreased public access

to the beach areas. The bill as cleared authorized $150 million over five years to ameliorate these and other energy related environmental damages to coastal areas.

Under the former provisions of § 312 of the Coastal Zone Management Act, a state that failed to meet the obligations of state and national interests in its coastal management program stood to lose all financial assistance. This drastic penalty was, in fact, the only penalty permitted under former § 312. Final

Photo by Conrad Neumann

bill HR 6979 provides a more flexible alternative designed to better implement state management programs. The Secretary is now authorized to reduce the amount of the total grant by a maximum of 30 percent should the Secretary determine that a state shows inadequate progress in achieving the national coastal objectives of § 303. Of course, if a state unjustifiably deviates from its management program or grant agreement and refuses to remedy the deviation, the Secreatry may still withdraw approval and financial assistance from the State's management program. Before this severe penalty is imposed, however, the coastal state must have notice and opportunity for a public hearing. The Amendment also ensures that a state will have fair opportunity to rectify any deviations prior to being penalized.

New § 312 also directs the Secretary to obtain and disseminate to the states, information concerning improvement of state coastal management programs. These distributions will probably contain information about other federal monies available to enhance coastal management programs.

EVALUATION

Another kind of evaluational system is included in HR 6979 as an amendment to § 316 of CZMA. The committee comments refer to an effort to achieve a "coherent and consistent" national coastal policy by requiring the Secretary of Commerce to review systematically other federal coastal resource porgrams to pinpoint conflicts between these programs and the Coastal Zone Management Act. For example, the objectives or effects of other agency administrative decisions may operate in opposition to those of the Coastal Zone Management Act. Final bill HR 6979 places priority upon implementation of the CZMA; new § 316 directs federal agencies with programs conflicting with the National Coastal Policy to revise or amend their procedures to eliminate interagency counteraction as much as possible.

Finally, the Coastal Zone Management Act was modified to provide for a two-house Congressional veto of final regulations promulgated under the Act. If, after 90 calendar days of continuous session, a concurrent resolution of disapproval has not been passed by both houses, the proposed final regulation will become effective. This provision will expire with the authorization of the entire bill on September 30, 1985.

In conclusion, the basic thrust of House Bill 6979 as cleared by Congress seems to be a redistribution, rather than an increase, of federal monies to aid states in administering coastal management policy. Congress has seen fit to specifically spell out national objectives to be met by coastal state programs, and to emphasize an implementation as opposed to a *developmental* phase for these programs. Small grants have been made available to mitigate environmental damage to states adversely affected by expanded use of alternate energy sources, and even smaller amounts have been provided to redevelop urban waterfronts and port areas. The amendments are intended to strengthen the Coastal Zone Management Act and to encourage and support voluntary participation by the states in the Coastal Zone Management program. It is hoped that the new amendments will enable state and federal agencies to coordinate activities and policies to permit a cautious approach to development of coastal areas without damaging irreplaceable natural resources.

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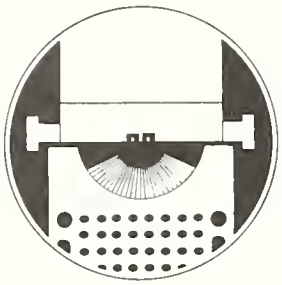

Letters

Cape Lookout Management

Last May the National Park Service released its draft environmental impact statement for the Cape Lookout National Seashore. The proposed management plan covers a 55-mile stretch of Carteret County barrier islands, including Portsmouth Island, Core Banks, Cape Lookout, and Shackleford Banks, or roughly the area between Ocracoke Inlet to the north and Beaufort Inlet to the south. The land use, transportation, and environmental proposals planned by the NPS may be of interest to readers of *carolina planning* in this special coastal management issue.

Cape Lookout National Seashore was established by Congress in 1966 to preserve an area of "outstanding natural and recreational values," and is now one of eight NPS areas of the Atlantic and Gulf Coast barrier island system. Settlement on the Seashore islands has always been relatively sparse, with two main areas serving as foci. Diamond City, a whaling community on Shackleford Banks, was abandoned after the devastating hurricanes of the late nineteenth century, and today virtually no trace of inhabitation remains. Portsmouth Village, a fishing and trans-shipment point, at the northern end of Core Banks, survived well into the twentieth century, with very few occupants even today. With no bridge link to the mainland, visitor access to the Seashore depends either on personal boats or on private ferryboat operators, who handled roughly eighty per cent and twenty percent respectively of visitor traffic in 1978.

The NPS plan for the Seashore includes two fairly controversial proposals. First, seventy-one percent of emergent land would be designated for inclusion in the National Wilderness Preservation System. Second, private vehicles would be provided through a public transportation service for the southern thirteen miles of Core Banks. Further dispersion of visitor access involves spacing out the present four ferry-landings, and continuing the present policy of allowing access by private boat.

Public response to the Plan thus far has been considerably weighted against the wilderness plan and for continued private vehicle access. The Core Banks Club, the NC Beach Buggy Association, and other Plan opponents have been well represented at recent hearings. Recognizing a classic environmental confrontation, Plan supporters, including the Sierra Club and the Audubon Society, have found it necessary to suggest some form of compromise. In the face of this public reaction, NPS re-evaluation is hard to predict.

In 1978, 907 vehicles were ferried to Cape Lookout the entire year. That year, only twenty-two percent of recreational visits involved the use of a vehicle. Are the vehicle users really speaking for the majority of seashore users? What about the non-motorized fishermen, the beachcombers, the hunters, the picnickers, the walkers? And what is going to keep the numbers of vehicles, and the associated impact, as low as it is today?

The harm is in the few dictating the noise and disruption of the off-road vehicles, or the many who come to Cape Lookout to "get away from it all." There are unlimited areas where vehicle users can drive up and down the beaches to their hearts' content. There are very few coastal areas where the motor vehicle is not a force heard over the sea winds.

The NPS proposal for Cape Lookout is floundering. The Plan deserves better. Comments can be addressed to: Superintendent Preston D. Riddel; Cape Lookout National Seashore; P.O. Box 690; Beaufort, N.C. 28516.

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Pocosins In Carolina

On January 3 & 4, 1980, the Integrated Case Studies Program at Duke University's School of Forestry and Environmental Studies sponsored a conference on alternative uses of pocosins in North Carolina. Pocosins, which take their name from the Algonquin Indian word meaning "swamp on a hill," are freshwater wetlands, or evergreen shrub bogs, found in the coastal plains from Virginia to northern Florida. Twenty years ago, pocosins were exposed to only minimal development pressures since attempts at drainage were often unsuccessful and the dominant species of the pocosins, the pond pine, had been logged. At one time pocosins covered approximately 2.2 million acres of eastern North Carolina. However, in recent years the scarcity of land and the increasing demand for timber, food, and energy has led to the clearing and drainage of large amounts of pocosins at an alarming rate. The purpose of the conference was to convene representatives from a variety of groups interested in pocosins, ranging from industrial to agricultural to conservation groups, as well as federal, state, and local levels of government, and to provide a forum for a cross disciplinary examination of the current knowledge of pocosins, and the economic, ecologic, and policy aspects of alternative uses of pocosins.

Speakers at the conference presented papers on resource ecology; non-industrial values of pocosins; industrial values such as agriculture, peat mining, and coastal fishing; resource economics and sociology; and law and policy. The conference illuminated numerous little-known facts about this coastal resource and areas of further research. Ecologically, pocosins are one of the least studied systems in the United States. The people of North Carolina are generally unaware of this resource or its value to society. Once drained, pocosins have some potential for increased economic returns as agricultural or timber land. In addition, large amounts of peat for energy production are found in pocosins. On the other hand, drainage of pocosins increases the freshwater runnoff into the North Carolina estuaries and causes salinity changes which are harmful to many commercially valuable species of fish and shrimp. Pocosins provide a valuable habitat for many wild plants and animals, especially the black bear. They are also valuable in their natural state as open space and as a habitat for scientific study and education. Current coastal laws, both state and federal, do not address the management of pocosins and thus there is no assurance that the resource will be managed with the proper balance of uses. Continued drainage of pocosins without knowledge or regard for what drainage can do to the ecological balance of the coast jeopardizes pocosins as well as other coastal resources integrally related to pocosins.

Participants at the conference concluded that North Carolina needs to develop a management policy for pocosins based on a complete economic and ecologic analysis of the values of pocosins in their various uses. The management plan should combine both public and private sector viewpoints in developing a policy. Participants in the conference raised many new issues relevant to the fate of pocosins. Many felt that the state of knowledge about pocosins today is at about the same level as the level of understanding of the importance of salt marshes was fifteen years ago.

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Development Planning For Barrier Island Maritime Forests

During the last twenty years, the importance of ensuring proper land planning and landscape management on barrier islands has been firmly established. Culminating with the passage and implementation of the North Carolina Coastal Area Management Act of 1974, the overall planning and management process for barrier islands has substantially improved the balance between island development activities and the ability of the barrier island to maintain its essential ecological and geomorphological functions and processes. In the context of current comprehensive planning efforts for barrier islands, maritime forests have become the last major component of the island system which has yet to come under strong regulatory control.

Although considerable development in maritime forests has occurred in the past, only recently have researchers come to more fully understand the strategic role that maritime forests play in the overall maintenance of the barrier island ecosystem. Growing recognition of the maritime forest's functional importance coupled with the prospect of increased development activity and a firmly entrenched planning and regulatory framework suggests that management of the maritime forests could prove to be a key planning issue on barrier islands in the 1980s.

Although a case will be presented establishing the importance of the maritime forest, a discussion of the merits and drawbacks of coastal area development will not be undertaken. Development will occur on the barrier islands. The relevant issue is how to plan for development without compromising the public's interest or stifling the private sector. In the case of maritime forests, the answer lies in clearly formulated land use policy, effective though not crippling regulation, long term research, and economic incentives. What is intended here is to put the issue of maritime forest management into a more complete perspective for those involved with coastal area development.

Before describing one example of innovative maritime forest management initiated through the private sector and later presenting some comments on regulatory controls, a review of the structural and functional characteristics of maritime forests will provide a context through which management concepts can be explained. The description of maritime forests and their management concepts can be applied to most situations; however, the physical character of each barrier island and its particular maritime forest is largely controlled by local physical, ecological, and sociological forces. Therefore, management strategies must be tailored to fit each island's particular forest and the development pressures it faces. For the remainder of this article, Bogue Banks, located on the southeastern North Carolina coast near Morehead City, will be used as a vehicle for interpreting the maritime forest and the problems encountered in its management.

STRUCTURE OF THE MARITIME FOREST

Various forms of maritime forests can be found along coastal environments worldwide. There is some debate as to the precise definition of a maritime forest but those present on the North Carolina coast can be best described as oak-juniper-holly-pine-dominated forests on barrier islands or immediately adjacent to estuarine waters that have developed under the influence of salt spray. In this case, we will restrict our consideration to those maritime forests found on Bogue Banks. For management purposes, all stands of woody vegetation on the island will be considered as some form of the maritime forest community.

The primary physical forces which control the structure and composition of maritime forests are wind, salt spray intensity, and topographic

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position, with the incessant salt spray of this oceanic environment being the single most important factor. Depending on the proximity of the forest to the ocean, its topographic position, and its exposure to salt spray, the maritime forest may exhibit several different physical forms and spatial arrangements. Closer to the beach, the forest's presence is shielded by the foredunes and is manifested in a dwarf form, often less than three feet in height. The trees, shrubs, and vines are massed into a shrub thicket with a tightly woven, inter-connected, sheared canopy.

The effects of the salt spray and wind not only limit the forest's composition but also give the forest canopy its well known asymmetrical windswept form. While fine sand particles carried by the wind damage the exposed leaf surfaces, magnifying the toxic effect of the salt, higher salt concentrations coincide with the growing season, damaging new growth and terminal buds. This combined interaction results in increased lateral branching toward the top of the tree or shrub and encourages elongation of branches on the protected leeward side of the plant. The canopy in this intense salt spray shear zone of the forest is a finely woven network of interlocking canopies forming a common physical unit which may extend over many acres of forest. In this way, the individual plants in the maritime forest work collectively to reduce the amount of each individual's surface area exposed to the salt spray, protect the understory and forests behind it, and provide extraordinary resiliency to potentially destructive high winds.

Two points need to be re-emphasized here due to their fundamental importance to the formulation of an effective management strategy for the forest. Wind and salt spray are the overriding factors which control the structure and composition of vegetation growth in the maritime forest; moreover, the forest canopy in the salt spray shear zone functions essentially as a single unit providing protection to the area beneath it and the remainder of the island in its leeward shadow. Because of its proximity to the ocean, the shear zone will come under more development pressure and will be most vulnerable to impacts resulting from development activities.

FUNCTIONS OF THE MARITIME FOREST

The maritime forest is unique not only in its limited distribution, physical form, and species composition, but also in its functional capacity. Although the unusual resiliency and physical character of the maritime forest surely preserves its own integrity and ensures a favorable degree of environmental stability, the presence of the maritime forest plays a significant role in the long-term maintenance and stability of the entire barrier island. Maritime forests serve to conserve groundwater by reducing evaporation; utilize and recycle scarce nutrients in a relatively sterile environment; aggregate soil material, thereby gradually elevating the island; provide some measure of hurricane protection; and serve as a major stabilizing component of the overall barrier island system (Bellis, et al., 1976).

Beside the long-term dynamism of the barrier islands as sea level slowly rises, daily and seasonal forces influence the maritime forest and any development on the island. The two main short-term forces are wind erosion and periodic oceanic storms and hurricanes. Winds of only ten to fifteen mph will initiate sand movement; moreover, winds on many islands will exceed forty mph during any month of the year (Au, 1974). Where present, healthy and self-perpetuating maritime forests serve as the primary stabilizing force for shifting sands on the interior portions of the barrier island. In some cases maritime forests are being overrun and completely covered by encroaching active dunes. However, the forest typically is in a tenuous balance with the wind and sand, and in many cases is slowly colonizing and stabilizing previously unforested areas.

"MARITIME FORESTS PROVIDE THE ONLY TRUE PROTECTION FOR DEVELOPMENT ON THE ISLAND DURING A HURRICANE."

Undoubtedly, the most destructive and potentially devastating forces for barrier islands and their associated land development are severe storms and hurricanes. Maritime forests provide the only protection for development on the island during a hurricane. By deflecting the brunt of hurricane-force winds, maritime forests have proven to be the most effective protection for island buildings. The reason behind this lies in the physical character of live oak and other forest species which are extremely resistant to strong winds and uprooting due to their well established root system, low center of gravity, and resilient wood. The protective features a healthy maritime forest offers for a residence on the island is incomparable, and if not properly managed, essentially irreplaceable.

Clearly, the distinct structural and functional aspects of the maritime forest which have provided for its development and maintenance on the barrier islands are precisely the features which can be used to protect associated island development. The core of any effective forest management strategy should be formed around these features which characterize a properly functioning maritime forest.

IMPACT OF DEVELOPMENT ON MARITIME FORESTS

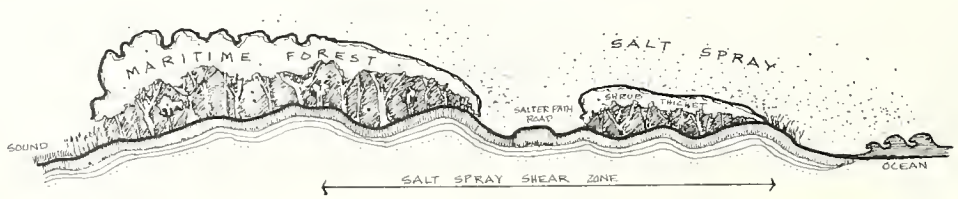
From a land use perspective, the significance of the adaptive morphology and functional roles of the forest cannot be overlooked. The management implications of the fact that maritime forests generally represent the most stable sites on the island is self-evident. Areas which are presently forested are generally the safest and most reasonable areas in which to build. If their protective functions are to be retained, development must adhere to sound management practices for the forest based on a fundamental understanding of the dynamics which control their formation.

Slight changes in the existing environmental conditions can disrupt the stability created through the establishment of the maritime forest. Where the foredunes or the maritime forest has been completely cleared, an increase in salt spray exposure, the initiation of shifting dunes, or sea-water flooding is likely to occur. Obviously, clearing the forest will in some way neutralize the protection previously provided to development by the maritime forest. For this reason, management strategies for protecting the maritime forest must be formulated around reducing the potential impact of increased salt spray, migrating sands, and saltwater immersion.

Thus, from an ecological and management perspective the salt spray shear zone should not be violated. This makes sound ecological sense, but unfortunately flies in the face of coastal development economics. Oceanfront lots often represent the profit margin for developers that can allow them to develop less densely on the sound side of the island. The extent of impact that development activities will have in these areas is dependent on the existing environmental conditions, the type and extent of the disturbance, the efforts made to protect the forest during construction, and the post-construction efforts to rehabilitate the forest. In terms of reducing the impact of salt spray, a number of basic planning and construction guidelines should be considered:

1. Avoid siting buildings or roadways on exposed sites at higher elevations. The impact of salt spray increases with closeness to the beach and at higher, more exposed elevations.
2. Do not clear the understory of the residual forest. The understory reduces salt penetration beneath the canopy.
3. In all cases, leave the leading edge of the forest which fronts the ocean intact. This will help prevent the initiation of dune migration, and help reduce the risk of damaging salt water flooding. It is the key feature in the entire forest's canopy. The elevation and extreme exposure of the frontal edge makes regeneration and re-establishment of this critical component of the maritime forest difficult.
4. Avoid clearing large areas of forest. Clear only as much forest vegetation as is needed for the actual construction of a building or roadway. Where feasible, align roadways parallel to the ocean and, if possible, less than forty feet in width. This will help to reduce the effects of salt spray on the newly exposed trees.
5. Efforts should be made to site buildings behind dunes and below the existing canopy line.
6. In sections of residual forest, leave as large an area as possible of continuous canopy intact. If a large enough stand is not left, given the existing salt spray concentrations, the entire group of trees will likely be eliminated in a few years.
7. In areas of long continuous cuts, salt spray fences have proven to be very effective in reducing die-back of newly exposed vegetation. However, by encouraging the growth of less salt-tolerant species behind the protective cover, re-exposure after the fence is dismantled

Figure 1. Diagrammatic cross-section of maritime forest near West Pine Knoll Shores on Bogue Banks. *Graphic by V. Zucchino*



might renew the die-back process. Some suggest allowing the exposed forest to naturally re-establish its canopy angle, a process that may be well underway after four to five years (Seneca, 1979).

8. As permitted by construction schedules, avoid clearing the forest during early spring and summer when new growth is particularly susceptible to salt spray damage.
9. Strong consideration should be given to the use of low pressure ground absorption septic systems. The shallow, narrow trenches used in low pressure systems can be installed with a limited amount of tree removal and canopy disturbance.

In terms of efforts to rehabilitate the residual forest, several actions can be taken:

1. Place salt spray fences in front of newly exposed sections of forests that can be expected to receive high levels of salt spray. Revegetation with native shrubs and trees can also be used to protect the forest and encourage the re-establishment of the canopy angle.
2. Stabilize cleared dunes or other open sandy areas with appropriate grasses (sea oats or American beachgrass) to prevent any encroachment of shifting sand at the base of the remaining trees.
3. Help save individual trees and shrubs by removing damaged branches, attending to trunk scars, and through fertilization and watering.

Figure 2. Salt damage to forest vegetation exposed by realignment of Salter Path Road on Bogue Banks. Note newly formed basal sprouts in foreground. Photo by L. Zucchino

Two less immediate impacts on the forest -- lowering of the water table and depletion of nutrients -- have also been noted. Lowering of the water table can be partially attributed to the combined effects of development activities, including excessive pumping of groundwater, increased stormwater runoff, and increased evaporation from reducing forest cover. The maritime forests may be subjected to drought conditions as the water table drops below the root zone and may also be damaged by saltwater intrusion into the freshwater aquifer of the island (Bellis, 1969). Secondly, as a nutrient-sensitive ecosystem, there is some evidence that the ready availability of nutrients, particularly nitrogen, may be significantly diminished as a long-term effect of excessive forest removal (Bellis, pers. comm.).

THE BOGUE BANKS EXPERIENCE

The value of the protective features of the maritime forest was not unknown to the early settlers of barrier islands. A number of fishing villages were established on the islands in the early eighteenth century, nearly all of which shared one common characteristic: the village structures were placed on the sound side of the island within the protective cover of the maritime forest. The village of Salter Path on Bogue Banks is an excellent example of early spatial relationships between buildings, the forest, and the ocean.

The emergence of a less sensitive approach to development within the maritime forest on Bogue Banks and other islands took precedence after World War II (Pilkey, 1976). Essentially unchanged since that time, large scale and piecemeal development has continued to devastate the maritime forests. The driving forces behind this approach mirrored the gridded tract subdivisions that were mushrooming on the mainland. An increasing market demand for oceanfront lots and the relatively unsophisticated techniques employed by developers of the era resulted in the wholesale destruction of maritime forests and in some cases resulted in the severe alteration of the fundamental structure of the barrier island system. Ecological research on maritime forests had begun but was primarily limited to descriptive ecological studies. Some researchers were beginning to study the influence of salt spray on the vegetation and the integral relationship that existed between the forests and the long-term maintenance of the islands.

The complex land planning and regulatory framework that now overlays the land development industry had not yet been established after World War II. Developers were not nearly so constrained by regulatory agencies nor were they aware of the role that dunes, forests,

and marshes had in the long-term protection of their developments.

While the development of the island accelerated, two events had considerable impact on the tone and direction which land use planning regulations and land development projects have taken on barrier islands and on the subsequent treatment of maritime forests: the extremely devastating Hurricane Hazel of 1954 and, twenty years later, the passage of the North Carolina Coastal Area Management Act.

Hurricane Hazel brought to bear the devastating effects that hurricanes could have on poorly sited developments. Although memory of the damage caused by Hazel has dimmed for some and is virtually inconceivable to many island newcomers, many homeowners on Bogue have consciously integrated their homes into the maritime forest for protection, for privacy, and for the image of being sensitive to natural surroundings. A tour of new home construction sites in the maritime forest on Bogue will reveal that such efforts are becoming the rule rather than the exception they were only a decade ago.

The Coastal Area Management Act provided the legal framework for the formulation and implementation of comprehensive land use planning objectives for the barrier islands and other coastal areas. The proliferation of federal, state, and local regulations to help ensure proper development on barrier islands has served to significantly reduce the net amount of land available for development on the islands. Moreover, by limiting development in ocean hazard areas, estuarine shorelines, designated natural areas, and flood-prone areas, greater development pressure has been placed on the interior portions of the island, much of which is presently forested on Bogue Banks. So, not only has the pace of development increased, but the amount of available land has been decreased leaving maritime forests in a potentially precarious position.

"...LARGE SCALE AND PIECEMEAL DEVELOPMENT HAS CONTINUED TO DEVASTATE THE MARITIME FORESTS."

A third and equally important influence on the development of barrier islands and maritime forests has evolved over the past decade: a marked shift in consumers' perceptions of what constitutes quality coastal development. A significant segment of the market has come to associate quality development with the well planned, "ecologically sensitive" communities and developments that became the symbol of proper coastal development in the 1970s. The most notable examples of this type of development are Amelia Island and Sanibel Island on the Florida coast, Sea Island in Georgia, and Hilton Head Island off the coast of South Carolina.

Many of the innovative planning, design, and marketing strategies used in these well-financed efforts have migrated north and found their way to the North Carolina coast. Although developments directed toward proper island development are not pervasive on the North Carolina coast at this time, the handling of maritime forests undergoing development has improved considerably since the 1950s. Interestingly, this improvement can be attributed more to an enlightened market demand and appreciation for the aesthetic and protective features of the maritime forest than to any influence from the regulatory process.

One development in North Carolina that embodies many of the issues discussed so far is the West Pine Knoll Shores development on Bogue Banks.

THE WEST PINE KNOLL SHORES DEVELOPMENT

The West Pine Knoll Shores condominium development is under construction on a 135-acre tract on Bogue Banks within the incorporated limits of the town of Pine Knoll Shores. The tract encompasses the breadth of the island from ocean to sound for nearly a mile between the Roosevelt Natural Area and the western limits of the town. The tract, owned by one part of the Roosevelt family, once included the adjacent acre section which was donated to the State as a natural area in 1971. The remainder, zoned for commercial development by the town, was retained for development purposes. The donation of the Natural Area reflected the Roosevelts' commitment to environmental conservation. The quality of the development efforts on the remaining acreage attest to the family's willingness to take the necessary steps for responsible development of the island.

Preliminary planning studies for the tract revealed a number of constraints for the project, both regulatory and ecological. Given 135 acres, less than 75 acres were available as suitable building sites. The remaining undevelopable acres were represented within either the CAMA-designated ocean hazard zone or estuarine areas, within the flood hazard zone delineated by the Federal Flood Insurance Program, within a fifty foot setback from the main island road required by the town, or as recreation areas, open space, and roadways planned for the development. One important implication of these constraints was that nearly all the developable sites were in areas covered by dense maritime forest, much of which lay within the salt spray shear zone.

Figure 5. Ocean Grove units carefully sited within a well maintained shear zone portion of the maritime forest. Photo by L. Zucchino

With these identified constraints, a very real concern for the developers became how to develop the tract at the highest reasonable density for economic return while preserving the integrity of the forest for its functional benefits. Of equal importance from the developers' viewpoint was the distinct island character afforded by the maritime forest which was seen as a very effective marketing advantage. Thus the maritime forest became an influential element in the overall land planning, site layout, architectural design, and marketing strategies for the development.

One of the most effective planning tools for protecting sensitive environments is the cluster development concept. Cluster development of a maximum number of units is a distinct advantage in the case of maritime forests. Given the opportunity to cluster, a net density of eleven units per acre and a gross density of five units per acre was achieved for the entire 135 acres. With a market projection of approximately 800 units for the development, the clustering option resulted in less extensive and more cost-effective road, sewer, and utility systems while disrupting a significantly smaller portion of the tract. As a result of the trade-off for higher density, more than fifty acres were left as open space, a considerable portion of which was undisturbed maritime forest.

The first phase of the development, Ocean Grove Condominiums, provided a test case for the entire project. Could seventy-two units be sited on ten oceanfront acres while maintaining the protective and visual character of the frontal dunes and maritime forest? Of ten acres, only six acres were available for buildings, parking, access, and pool areas after excluding required setbacks. Through finely-tuned site planning, sensitive architectural design, and exacting construction supervision, some surprising results were achieved.

A design and construction strategy was carefully formulated to integrate the given economic and architectural package into the maritime forest with minimal impact. The following concepts were incorporated into the design and construction process for the Ocean Grove Condominiums:

1. To retain the desirable visual and spatial character of the forest, as much as possible of the existing forest was left intact through: sensitively sited, tightly-clustered units, the use of narrow access drives and parking beneath units.
2. The architect's design of the condominium units offers limited wind resistance and encourages laminar flow above the units; integrates the units as closely as possible into the forest, with the units located within several feet of the canopy in many cases; takes advantage of the canopy's ability to reduce summer heat, winter winds, glare, and traffic noise; and reduces grading costs and the amount of disturbed area by stepping the units' foundations up the dunes.
3. When an area was developed all trees greater than eight inches in diameter and all trees to be saved were clearly marked before grading, units were sited to preserve intact stands of continuous canopy within the cluster, and constant supervision was given to grading and building crews to prevent additional forest damage.
4. Pedestrian systems were elevated boardwalks within undisturbed forest, constructed beneath the forest canopy where possible. They were designed to minimize the number of canopy cuts perpendicular to the ocean and to reduce the amount of "edge cut" in the forest by consolidating pedestrian traffic within each eighteen-unit cluster.
5. Landscaping efforts included stabilization of exposed dunes with native grasses and rehabilitation of exposed forest edges with proven native and other salt-resistant plant materials, careful maintenance of damaged and residual trees, use of permeable turf stone paving material in parking areas to improve groundwater recharge, and plans to transplant native plants from construction areas for landscaping purposes.

The first phase of the West Pine Knoll Shores development is nearing completion. Similar standards for the conservation of maritime forests will be included in subsequent development phases. As more experience is gained the strategies and techniques will be refined.

Clearly, the West Pine Knoll Shores development does not represent a simplistic, altruistic attitude by the developer, but more realistically, it was molded by a complex matrix of regulatory, economic, market, ecologic, and design parameters. In this case, the private

sector has accomplished a degree of conservation for the maritime forest that regulation might not be able to do as successfully.

More importantly, the development sets the pace for what can be accomplished through proper planning and design and it will have a positive influence on other coastal developments. The successful sales for the condominium units certainly can be partially attributed to a more enlightened market which is willing to share enough of the expense for protection to justify the developer's extra effort and costs required to conserve a valuable resource. Of course, not all developments can be expected to be quite so responsive to the requirements of the maritime forest. A limited amount of regulatory control will be necessary to ensure that at least the fundamental integrity of the maritime forest is protected, leaving the additional efforts for protection with the private sector.

FORMULATING A MANAGEMENT STRATEGY FOR MARITIME FORESTS

The structure, function, and dynamics of maritime forests and associated development impacts have been addressed in an effort to establish the importance of developing effective forest management strategies. Two basic strategies must be noted when considering the impact of land development activities on the maritime forest. First, clear policies must be developed by state and local planning agencies which will determine in which areas and in which part of maritime forests development will take place. Second, state and local planners, developers, and homeowners must agree on and understand the significance of the maritime forest, how it should be handled during the development process, and how the residual forest should be managed after construction.

In terms of federal, state, and local planning, only limited efforts have been made to formulate a clear and effective policy toward protection of maritime forests. Other than an increasing awareness of the problem by public agencies, the dominant regulatory influence to date has been that of preservation.

Federal efforts in land acquisition have indirectly preserved many sections of maritime forests through their inclusion in the national seashore system. Although this ownership encompasses a considerable portion of North Carolina's barrier islands, the amount of maritime forest on the true Outer Banks is limited, often representing only twenty percent of the land area (Godfrey and Godfrey, 1976). Other efforts through state agencies and quasi-public organizations such as the Nature Conservancy have been directed toward the preservation of specific stands of forest which either represent unique natural areas or have been available for acquisition or donation as State Parks or Natural Areas. Examples of such forests are found in Nags Head Woods, Roosevelt Natural Area, and Hammock's Beach State Park. At the local level, a number of coastal communities including Emerald Isle and Pine Knoll Shores have developed provisions within their regulatory codes which require some degree of protection for maritime forest vegetation during the site development process.

More recently, the North Carolina Office of Coastal Management has taken a more active approach by preparing preliminary performance standards which would be applied to all maritime forests present within designated Areas of Environmental Concern (AECs) (Brower, 1980). The standards, though carefully developed, would be limited in extent to AECs, very few of which have been designated. Alternatively, if through the formulation of a state policy on maritime forests, all forests were given AEC classification similar to those imposed on estuarine areas, an unrealistic hardship would be placed on the private landowner. Thus, at present, the state's unofficial policy on maritime forests is constrained by a dominant preservation tone in which only limited areas of forest might be expected to come under some protection. If it were implemented over all maritime forests, its performance standards as proposed would be too restrictive.

Considering the limited ability of preservation techniques to protect all maritime forests and the sobering thought that most privately-owned tracts of maritime forest may well be developed by the end of this decade, future strategies must certainly embrace a more flexible conservation-oriented perspective.

Interestingly, one such strategy has emerged from the U.S. Army Corps of Engineers. After years of pursuing costly and short-term structural solutions to stabilize barrier islands and protect federally-insured devel-

Figure 6. Elevated boardwalks beneath canopy limit disturbance of the maritime forest. Photo by L. Zucchino

opments (i.e., beach replenishment, groins, jetties, and bulkheads), the Corps has recently begun to entertain the concept of non-structural alternatives. The most promising alternative is an intact and properly functioning maritime forest. Efforts to investigate the land use implications of just such an approach have recently been stymied by a reluctance on the part of the Corps to become directly involved with the associated land use planning issues. The technical information amassed by the Corps is impressive and the well-conceived land planning strategies which give high priority to maritime forests represent the most progressive efforts to date by a government agency to manage the forests.

The Corps' strategy would emphasize some form of local or state regulatory control over the salt spray shear zone while managing the remainder of the maritime forest less rigorously. The mechanism which would provide this protection has not yet been fully elaborated but would necessarily require an uneasy marriage between state and local government and the private sector. Any management effort will face the problem of the large amount of forest which is privately-owned and strong local resistance to any increase in the state's regulatory role in coastal development. These constraints suggest that future efforts to protect the maritime forests will revolve around improved local ordinances and an increasing awareness by the private sector of the increased market value that a well-managed maritime forest can bring to a residential lot or development.

A reasonable approach to comprehensive planning and management for maritime forests must include a concerted effort between federal, state, and local agencies. In addition, there must be active participation by private development interests and research institutions. The Corps of Engineers should reactivate its plans for developing non-structural solutions to barrier island stabilization stressing protection of maritime forests through proper land planning. Through CAMA, the State should consider AEC designation for the salt spray shear zone of the forest, provided that standards of performance can be developed which will protect the integrity of the forest without depriving the private landowner of a reasonable use of the land. State agencies and private consultants could provide expertise and technical assistance to developers interested in protecting the forest during development. Management of the forest outside the shear zone should be left to each local government's initiative. They should, however, be guided through CAMA to develop effective vegetation ordinances and to use proven economic incentives to encourage cooperation from the development industry and local landowners. The question remains as to whether the next several years will produce the necessary balance between coastal development interests and regulatory controls which will serve to protect sensitive and vulnerable maritime forests and allow for a reasonable integration of coastal development into the remaining forest.

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Todd Miller

No Room In Paradise: Seeking Alternatives For A Brighter Future

Coastal regions of the nation have gained immense popularity over the last two decades. In the sixties, U.S. population grew twelve percent while the number of residents in the Atlantic and Gulf Coast states increased forty percent. The 1970 census reveals that more than half of the nation's population is within an hour's drive of the beach (Funk, 1977). This accessibility and increased leisure has escalated demand for waterfront property.

North Carolina has also had growing demands placed on its coastal resources by recreational activities. Between 1958 and 1970, the tourist trade in coastal North Carolina increased by 168 percent (East Carolina, 1971). In 1970 the state ranked ninth in the United States in terms of the number of second homes (66,811) within its borders. By 1976, the coastal region alone had attracted an estimated 83,690 recreational properties (Burby, 1979).

Tourism and second home development provide many benefits for coastal communities -- increased tax revenues, recreational opportunities, jobs, and an improved market for marginal farmland. If not properly managed, however, such rapid development may eventually destroy the very qualities of the local environment that attracted visitors in the first place. Residents of Ocracoke Village, a coastal community in North Carolina, are currently facing this threat. Their experiences, which have been documented by several surveys and numerous interviews, provide valuable insights into some of the tough planning problems that leisure industries pose for coastal communities (Miller, 1977).

THE COMMUNITY

Across the inlet from Ocracoke Village is the abandoned town of Portsmouth. Settled in the early 1700s, Portsmouth today is a ghost town with its few remaining houses, a church, post office, and Coast Guard Station, reminders of the once bustling seaport of 600 inhabitants. The Civil War's disruption of the local economy, combined with devastating hurricanes which destroyed warehouses and docks and caused drastic shoaling of channels to the port, forced the population to gradually disperse. The empty buildings, recently acquired by the Cape Lookout National Seashore, are being preserved for future generations to visit.

Ocracoke might have suffered a similar fate had it not been for tourism. Situated 30 miles out at sea on the south end of a narrow 19-mile stretch of the Outer Banks, its 775 acres are the only property in the vicinity not owned by the Cape Hatteras National Seashore. The village is the sole traffic route for vehicles transported by the Cedar Island, Swan Quarter, and Hatteras Ferries. Its unique and historic setting attracts sightseers from many places throughout the nation.

Local people state that in the 1800s Ocracoke was a transfer center for goods coming from overseas, with smaller vessels then carrying the freight to inland ports such as New Bern. Blackbeard and other pirates made a good living, as did more honest citizens engaged in raising cattle and fishing. Most fondly remembered is the ability of the islanders to work together and to help each other. "If a man had a boat or house to build," said one lifetime resident, "the men got together and did it. No one paid labor. In the winter, each family raised a pig, then they killed,as needed,to have fresh meat." This bond remained strong until the early 1960s. "Then everyone got busy making a living and now they don't have time for their neighbors." However, "in comparison with the rest of the world, it's

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still a good place to live." Almost all the people surveyed on the island considered the population "just right" or "too big."

The advent of state-supported ferries in 1957 caused immediate demand for activities relating to tourism. Limited personal services available at the time could not handle the thousands of people who were now "discovering" the island. Commercial fishing declined as local residents took advantage of more dependable employment opportunities provided by the ferries, park service, and tourist businesses. Increasingly, others left their families to join a branch of the military such as the Coast Guard or the U.S. Army Corps of Engineers or some other government service. Current employment options offer wages which have risen little since the days of fishing. Economic benefits derived from motels, restaurants, and stores are mostly being enjoyed by newcomers. The jobs they provide are seasonal and usually offer minimum wage.

Many tourists return repeatedly to the island, some eventually buying land and houses. Heavy demand for property has caused prices to skyrocket. For example, in 1967 one particular house and lot was valued at $5,000; the following year it was sold for $50,000. The likelihood of similar transactions could not help but tempt residents earning less than five to ten thousand dollars a year. Increasingly, property which families have owned for generations is being sold for high profits. Approximately three-quarters of the privately owned land is now in the hands of people from other places, i.e., developers, retired year-round residents, absentee owners, and those running most of the local commercial enterprises.

Looking for large profits, developers pumped sand into marshes behind the village in the early 1960s to open new housing areas. These new lots have replaced the natural tidal buffers between Pamlico Sound and the community. New and expensive homes now stand in locations which once were submerged by violent storm surges. With dredging and filling changing the paths that flood waters will take on the island, islanders fear the unpredictable effects of severe hurricanes.

Many of the new housing areas in the village are poorly designed. Although the homes being constructed are expensive and substantial, the roads and bridges that provide access are only temporary. No provisions have been made to provide for their maintenance. Any effort to get landowners to share the costs of repairs will be frustrated by the fact that many are hard to find since they do not visit the island on a regular basis. Dense housing patterns elsewhere in the village have contaminated nearby estuarine waters with runoff from septic tanks.

As a result of the influx of people, all the island's residents are benefiting from new community services. Garbage is no longer dumped on the back side of the island, but is collected and trucked to Manteo. A water system using deep-well water and desalinization equipment is replacing the use of rainwater for drinking and individual wells for washing. In addition, well-equipped volunteer fire and and rescue squads are also now on call when needed.

"ECONOMIC BENEFITS DERIVED FROM MOTELS, RESTAURANTS, AND STORES ARE MOSTLY BEING ENJOYED BY NEWCOMERS."

Because property is so valuable, most residents find it difficult or impossible to buy land. Young people put mobile homes in their parents' back yards. Even this solution may be eliminated as North Carolina's septic tank regulations place limits on crowding.

Although native residents are concerned about land shortages, they are in fact left with few options for improving the situation. Most of those surveyed own only enough for immediate needs. Those who have retained larger holdings intend to keep them in the family, or sell to neighbors. Since inheritances frequently necessitate the sale of property to the highest bidder, such loyalties are not likely to prevail. Also, individuals may be forced to sell property for economic reasons which do not allow for price-cutting. Such circumstances combined continue the trend away from ownership by the original families.

Many who buy for investment purposes are not going to sell houses at prices affordable to Ocracoke's youth who wish to remain in the village. Even some of the newcomers who cherish Ocracoke's location and scenery are not particularly taken by its traditional ways. Some are openly annoyed with locals, not wanting them as neighbors. One expressed the opinion that *his* kind of people support the island, and "it would be better to get the leech-like residents off my back."

Social conflict is a reality in the village of Ocracoke. Different backgrounds and economic status keep various groups at odds. Frequent complaints are that nobody wants to work, that there is no communication in the village, and that the islanders are lazy and apathetic. Local factions accuse outsiders of trying to run the island. "When they first came here," one resident said, "they had to live with us. Now we've got to live with them." Scornfully stated by another was that "they'll come here to get away from where they were, and then first thing, they're trying to make it like the place they left."

Survey results show great differences of opinion as to how the native population and outsiders think the island should be run. The majority of the islanders oppose any type of zoning or local government, maintaining they did without it in the past, and distrust it for the future. Outsiders want to preserve the appearance of the village, and consider local government a means to assure orderly growth. Proposals to form a town government have been hotly debated at local civic club meetings; these discussions include arguments that the community must preserve traditional scenery to protect its tourist industry. The majority of tourists visiting the island tend to agree with this statement. Usually not admitted in the debates is the fact that zoning and other development regulations only brush the surface of the problem, failing to recognize the overriding need for sincere community efforts to improve the overall economy.

Islanders say a storm "like we had in '44" will get rid of the outsiders. This hurricane moved slowly up the coast, creating a storm surge that backed eight-foot tides into Pamlico Sound. As the storm passed, its winds piled up the surge, pushing it towards the sea. In those days, Ocracoke Island had a lower elevation, which allowed the water to pass over it. Today, through government stabilization projects, more extensive vegetation and higher dunes run the length of the island. Some speculate that future storm surges may now be channeled through the village instead of flowing freely across the island. If damage is extensive, everyone will suffer, but outsiders have better financial resources to rebuild.

Photo by Ocracoke Photographer, Ann Ehringhaus

If present trends continue, the islanders will lose additional land, their living conditions will become more crowded and their wages more depressed. As happened in Portsmouth, Ocracoke's local residents will fade away. Only this time instead of being pushed out by the forces of nature, their plight will result from the attractiveness of their community to wealthy people who are able to out-bid them for their land. Newcomers will eventually gain control of the community, and what remains of the traditional structures will be zoned and preserved.

One can conclude that divisiveness in classifying citizens as "islanders" and "outsiders" is the root of the problem at Ocracoke. The immediate need is for one group to accept the other and to establish common goals. The village must operate as one unit rather than as two or more competing camps.

ADDRESSING THE PROBLEMS

In an attempt to develop mutual understanding of community needs, a planning committee has recently been formed. Comprised of business leaders, the clergy, and other local people, it represents the first formal effort on the island to consider development controls. The group has approached the East Carolina Regional Development Institute in Greenville, North Carolina, for assistance. Several of its planners are currently preparing a list of alternative development controls which will enumerate the pros and cons of each and detail steps needed to implement each alternative.

What are the alternatives for Ocracoke? The sea, the sound, and the National Seashores constitute magnificent resources. They can be promoted in future growth management strategies that are designed to enhance the economic well-being of local residents, thereby allowing them to compete with outsiders for land and houses.

Commercial fishing can potentially provide income not presently being realized. Trawlers travel from far and near to fish waters close to Ocracoke since these ocean and sound fishing grounds are extremely prolific. Several new seafood handling establishments have opened in recent years, enabling residents to derive income from fishing and crabbing. Approximately seven percent of the population is now fishing full time. Such incomes are severely limited by lack of large boats and sufficient gear. The Federal government offers loan guarantees and tax credits on money needed to buy or maintain fishing vessels. Counseling programs might serve to convince fishermen to expand their operations.

Although the Park Service operates a marina on Silver Lake, it may be forced to prevent

commercial fishing boats from tying up if too many start using the facility. Currently, boats are still free to anchor in the harbor for unlimited stays. Eventually the community will need additional docks for fishermen. An overall plan for constructing these piers is essential. For example, a dock was recently built too close to one used by the biggest trawler working out of Ocracoke. As a result it can no longer safely use its berth. A railway for hauling boats out of the water for repairs would also be a tremendous asset. Ex-post mistress Mrs. Wahab Howard recalls when she "could jump from cabin to cabin on fishing boats from the post office to where the ferries now dock." Return to commercial fishing as it was before would undoubtedly help the local people and improve the economy.

Any effort to manage future development in Ocracoke needs to be complimented by an educational compaign that recognizes the community's small size and traditional nature. Distrust of government combined with a general dislike of development regulations will make efforts to address growth problems a difficult undertaking. A formal education drive with public meetings and hearings will not work at Ocracoke. Past experience with such meetings conducted by the Park Service have been failures. A more appropriate way to gain public support for a growth management program is through informal communications.

Conversations with local residents about growth problems in the village almost always lead to an outpouring of complaints about current conditions. Most recognize that there are bad side effects to uncontrolled growth, but do not realize that there are alternatives to having to cope with the problems. Remedies suggested by friends and neighbors stand the best chance of being accepted. In particular, local merchants, ministers, schoolteachers, and other individuals in frequent contact with the community should be encouraged to talk about the planning process. These discussions will serve two purposes. First, they will inform and increase the interest of the community with respect to growth management. In addition, they will serve to educate the planning committee about the needs of the future.

Another facet of the problems facing Ocracoke is that Ocracoke lacks an institutional framework for pursuing land-use planning objectives. In this regard the community has two options: it can incorporate and form its own town government, or it can attempt to strengthen its working relationship with county government.

North Carolina has adopted specific criteria by which localities can form their own governments. Given its present state of development, size, and isolated location, Ocracoke meets all of these qualifications. Incorporation would provide the village with freedom to initiate new programs, an independent source of revenues, and the ability to adopt development regulations without having to go through the county government. However, given the current political climate in Ocracoke, it appears that support for local government is slim. In addition, incorporation may not be the best way to address Ocracoke's problems. There are currently 450 municipal governments in North Carolina, most of which are small. The 100 counties in the state have better leverage than these towns to attract the type of assistance Ocracoke needs.

Until recently, Ocracoke has not been well represented by Hyde County. Governing officials have openly admitted that the county board seldom considers the needs of Ocracoke because it is too far away and distinct in character. However, the first county commissioner from Ocracoke has just been elected and this may encourage the board to pay more attention to the island. The community could exert more pressure; for example, representatives of the village could go to county meetings with petitions and letters of support to request specific actions to help Ocracoke address its planning needs.

In proposing regulatory controls for Ocracoke, the planning committee has the delicate task of tailoring them to the independent nature of the villagers. Opposition to government controls will have to be overcome through education, and not by attempting to implement a regulatory scheme that is too radical, ambitious, and all-encompassing. Above all,

Photo by Ocracoke Photographer, Ann Ehringhaus

compliance with development controls can not require large outlays of capital because the people of Ocracoke are not in a position to afford such expenditures.

One place to start in developing a growth management program for Ocracoke is to determine how existing regulations and programs can be better used. For example, current enforcement of septic tank regulations is lax; even minimum setback requirements from estuarine waters are not being enforced. If the existing regulations were properly implemented, new development would be pushed into the outer fringe of the village, away from the densely populated shoreline of Silver Lake.

"...BUT THE FINAL DECISION RESTS WITH THE PEOPLE OF THE VILLAGE WHO HAVE THE POWER TO EITHER DETERMINE OR ACCEPT THEIR FATE."

New development controls are also needed for the village to come to grips with its growth problems. Some form of simple zoning which encourages new residential and commercial development in less populated sections of the community would serve to relieve the pressure on Silver Lake. Zoning would also stop a new trend in land development in the village -- the removal of older homes to provide locations for new commercial structures.

Hyde County has not adopted subdivision regulations. New housing areas in Ocracoke, espcially on the sound side of the island, are not provided with permanent roads or bridges. An ordinance that makes provisions for the proper design and installation of such structures would avoid many headaches and expenses for residents in the future.

Other alternatives are also being explored. One suggestion has been to nominate the entire village as an Area of Environmental Concern under the authority of the Coastal Area Management Act. This would allow the state to adopt a set of specific development controls in order to maintain the cultural characteristics of the community. However, most local residents are not likely to support state intervention.

The possibility of designating the village as an historic district is also being pursued. While limited regulations designed to protect the unique scenic qualities of the community might be acceptable to the villagers, many of the development controls that are traditionally associated with historic preservation would be hotly contested. Their resistance would stem from the fact that they could not afford to comply with many of the expensive building practices that would be required.

TOWARD GROWTH MANAGEMENT CONTROLS

The impetus to study growth management needs of Ocracoke comes from an emerging awareness of social and environmental problems attributable to present development patterns. Islanders, new property owners, and frequent visitors have all played a role in this process. With the press of population to coastal areas, growth will continue in the village. Eventually, some form of local government will be formed on the island. Whether it will be structured to meet the needs of the present populations, or of future, more transient, property owners, has not yet been decided. State agencies and technical assistance groups may provide guidance, but the final decision rests with the people of the village who have the power to either determine or accept their fate.

Those who value Ocracoke as a uniquely situated community requiring a new identity to justify its historical setting and resources should be able to work together for its protection, improvement, and well-being. In order to avoid the gradual displacement of the native population of the island, steps need to be taken to preserve the "best of the old" in Ocracoke while attempting to improve the economy of the community.

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Brian Benson

Aurora: Planning For A Small North Carolina Coastal Town

My first trip to Aurora, North Carolina was on an early fall day in 1974. I was travelling with other graduate students and faculty from the School of Design, North Carolina State University. Aurora's Mayor and Town Board had recently requested technical assistance from the School for the purpose of helping to solve some of the problems the Town faced. Randy Hester, Associate Professor at the School had decided to take this project on as a case study in his landscape architecture studio-workshop. The purpose of this one-day trip was to allow those graduate students who had selected this studio-workshop an opportunity to become acquainted with Aurora. For me, that initial visit, began an association with the Town that lasted three years. This article describes the planning process as it was developed and used in Aurora, along with an admittedly subjective analysis of some things learned as a result of doing planning and community development work in a small coastal community.

Aurora, North Carolina is a small rural town located in the central coastal county of Beaufort. It was incorporated in 1880 and served for many decades as a supply and market center for the surrounding farming community. In 1970 its population was 620.

During the 1960s and the early 1970s, elected officials in Aurora witnessed changes in their small town and surrounding region which concerned them. A massive deposit of phosphate, an ore used in the manufacture of fertilizer and other products, was discovered in the area during the 1950s. Believed to be one of the largest deposits of phosphate in the world, it lies beneath the land surface and water bodies at a depth ranging from 40 to 230 feet below mean sea level. During the early 1960s Texas Gulf Sulfer, later to become TexasGulf, Inc. (TG), began drilling test wells to determine if the deposit was of sufficient thickness and quality to justify the cost of extracting the phosphate ore. Demand for phosphate was increasing at this time, especially for use in the production of fertilizer. This market trend, combined with the discovery that the deposit was of a high quality, made the prospect of a surface mining operation near Aurora very likely.

Before the company could begin its mining activities, a small creek and land adjacent to the initial mining site about seven miles northwest of Aurora had to be substantially altered to create a barge canal. After processing, the phosphate ore was going to be shipped by barge and rail. Although this took place before present environmental impact legislation was enacted, a public hearing was required before dredging work would begin to suspend the water quality classification that had been assigned to Lee Creek by the State. The transcript of that public hearing provides clear evidence that both local and state officials were strongly in favor of the proposed TG operation primarily because of the anticipated economic benefit for Aurora and the area (North Carolina Board of Water and Air Resources, 1963). People were expecting new jobs and increased business activity for local firms. The declassification was approved, and the company began to construct its facilities. Full-scale surface mining began in 1964.

After the operation had been going for a few years, it became apparent to many townspeople that the economic growth benefits were falling short of expectations. Some of these expectations were probably unrealistic given that the mining operation was a capital-intensive activity. However, feelings of discontent and skepticism began to replace

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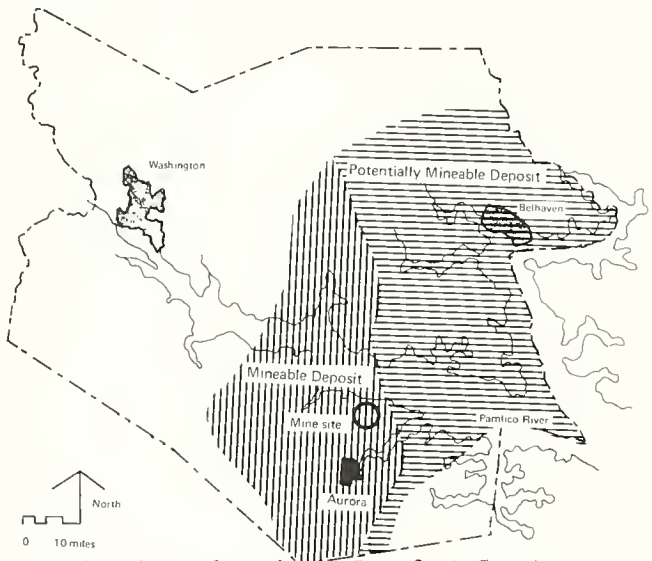
the earlier optimism. These concerns were reinforced by the generally poor relationship between TexasGulf and the town government at this time. Attitudes were mixed among townspeople. Even though Aurora had now grown as much or as rapidly as expected, local people were being hired by the company, making it possible for them to remain in the area rather than going elsewhere to seek employment. So, TexasGulf and shift-work became a part of Aurora's lifestyle, but concerns about the Town's future remained.



The phosphate deposit in Beaufort County. Source: School of Design, 1976

In 1974, another phosphate mining company, North Carolina Phosphate Corporation (NCPC), announced its intention to begin the extraction of phosphate ore from a site about 1 1/2 miles directly north of town. Once again many townspeople reacted to this proposed new mining operation with mixed feelings. Many were worried because it would be much closer to town than the existing TG operation. But, similar to the TG operation, the new facility would be providing jobs, and hopefully a boost to the local economy. Unlike the first time, however, town leaders were not willing to make assumptions about the balance of benefits and costs to Aurora. They believed that the new operation had potential for both positive and negative impacts and they wanted the opportunity to understand these impacts. Very simply, town leaders believed that given this information impacts could be modified so that Aurora's future would at least be secure, if not enhanced.

It was at this time (1974) that town leaders, with assistance from the regional council of governments, contacted the School of Design at North Carolina State University. Some of the architecture and landscape architecture studios at the School were being conducted as workshops with students and faculty working together on real projects. Aurora provided an excellent focus for such a workshop. The Aurora studio-workshop began in the summer and fall of 1974 under the direction of Associate Professor Randy Hester and graduate student Donna Palmer.

THE PROCESS

The first task for the Aurora workshop was to develop a comprehensive strategy to guide data gathering and analysis. Aurora, like other North Carolina coastal towns and counties in 1974, was under legislative mandate to prepare a land use plan according to Coastal Area Management Act (CAMA) guidelines. Preparation of this plan was, at least at first, our primary objective. The CAMA guidelines and regulations necessarily became an important element in developing the planning process. However, following CAMA guidelines became somewhat of a frustrating exercise due to the many revisions that took place during that first year, providing evidence that North Carolina's coastal area planning process was in its early stages and still evolving.

It was decided that data gathering should proceed along two parallel tracks, socio-economic analysis and natural environmental analysis. Stated another way: the impacts of change *on people* and the impacts of change *on land*. Each student took responsibility for specific tasks within these two broad categories according to their interest and educational background. There was a considerable amount of experimentation with information gathering techniques and ideas. Many approaches were tried, sometimes they were modified before being used, and often they were abandoned in favor of entirely new methods. The Aurora planning process, in fact, emerged out of these experiences.

"AURORA...WAS UNDER LEGISLATIVE MANDATE TO PREPARE A LAND USE PLAN ACCORDING TO THE COASTAL AREA MANAGEMENT ACT (CAMA) GUIDELINES."

Within the socio-economic element of the process the major objective was to discover the needs and concerns of Aurora's present and future citizens. The phosphate mining industry would be attracting new employees to the region. It was important to know what these people would be looking for in a community that would cause them to settle there. This information would be of value in planning an Aurora that would provide the identified needs of this population group. To accomplish this, a questionnaire was administered to a sample cross-section of TG employees. They were asked questions about their shopping, recreational behavior, and

housing-type preferences, among other questions geared toward producing a socio-economic profile of this group (School of Design, Technical Report One 1975).

Aurora's present population received the greater amount of attention and analysis. For this purpose, another questionnaire was developed by the planning team and administered with the assistance of the Junior Women's Club to nearly half of all households in the town. Some of the questions were similar to ones on the TG survey but others were related specifically to Aurora and its problems and prospects. The responses to many of the questions were interesting and provided good insight into some of the attitudes held by Aurora's citizens Most people surveyed agreed to limitations on town growth, and answered no to a question asking if they would be willing to sell and move from Aurora. About the same time in the process one student decided to spend some time working the local school system in an effort to find out about the attitudes of Aurora's young people. A technique called 'wish poems' was used to help the students articulate the problems and issues they perceived. Typical of the responses was a desire for Aurora to retain its small town atmosphere, coupled with an awareness of its evolving character. The issues students cited were incorporated into a video presentation at a public meeting, and proved extremely successful in pinpointing the townspeoples' sentiments.

"WORKING WITH THE PLANNING TEAM, THE TOWN BOARD AND PLANNING BOARD DEVELOPED A SERIES OF GOALS AND OBJECTIVES FOR AURORA."

The results of these surveys along with other information were studied carefully by the planning team and local officials. Working with the planning team, the Town Board and Planning Board developed a series of goals and objectives for Aurora. The goals covered a fairly broad range of concerns and were supplemented by more specific objectives. These goals and objectives along with the survey results were published as *Technical Report Three, Goals for Aurora* and distributed to every household in town (School of Design, 1975). Much of what was contained in this goals report was not new to many Aurora citizens. But, for the first time these concerns, needs, and hopes had been made explicit and therefore provided a public focus of attention for the planning and community development effort.

Additional research conducted within the socio-economic element of the process included a study of Aurora's history, its employment and economic characteristics, community facilities, and recreation needs (School of Design, Technical Report Two 1975).

The CAMA guidelines provided a framework to guide the natural environmental element of the data gathering process. This framework called for the analysis of constraints on land use, including physical limitations, fragile areas, and areas with resource potential. To accomplish this for Aurora meant bringing together information from diverse sources such as a soil survey completed in 1917, a more recent but incomplete soil survey, aerial photography, previous research, and extensive fieldwork. There was very little compatibility between these sources and our information needs or those specified by CAMA. We had to review, analyze and confirm these original sources. The information then had to be translated into a unified format that was comprehensive and could be used to produce a land use plan.

"...CONSIDERABLE ATTENTION WAS GIVEN TO SOIL CONDITIONS AND TO SURFACE AND SUBSURFACE WATER SYSTEMS."

During this phase of the data gathering and analysis considerable attention was given to soil conditions and to surface and subsurface water systems. Both of these natural environmental systems had played significant roles in Aurora's past and they were clearly going to continue to exert an influence in the future. Soils in the Aurora region were found to be fertile for agricultural purposes in spite of the high water table. This condition required that fields have drainage canals to remove excess water. Most farms in the area rotated their crop production between soybeans and corn.

Changes in the regional and local hydrology caused by the mining operation were a major source of concern. Much of this region is underlain by a wedge of sedimentary rock which contains an aquifer system known as the Castle Hayne formation. This aquifer is the principal water supply source in the area for individual wells and municipalities. When the mining operations began at Lee Creek it was necessary to continually pump water out of the pit so that excavation activities could take place under dry conditions. This pumping created a depressed water table throughout the area's subsurface water system, resulting in problems with water availability in many local wells. A large number of wells eventually had to be dug deeper to compensate for this drawdown of the subsurface water level. TG provided financial assistance to individuals for some of this work if the company was sure that the problem with a particular well was directly related to the mining activity. However, many believed that TG did not do

In 1979 the Town purchased land on South Creek for use as a public marina. Photo by Brian Benson

enough to correct this problem.

Work on the preparation of the land use plan became more intensive during the summer of 1975. Aurora and the School of Design had received a technical assistance grant from the Coastal Plains Regional Commission which allowed the work to begin on a full-time basis. It was at this time that Hester, Palmer and myself moved to Aurora for the summer in order to complete the land use plan. Actually living in Aurora, rather than making occasional field trips, created a much more productive work atmosphere. There was more time to spend checking field data, both socio-economic and natural environmental. An even more valuable outcome of that summer were the friendships we developed with many townspeople. Our previous status as "students from Raleigh" began fading. Workspace was set up in a backroom at Town Hall that had served at one time as the town's fire station. This convenient location allowed citizens to come by, see what we were doing and ask questions.

As Aurora's Land Use Plan began to take shape problems were encountered with the use of a single rural land classification as described in CAMA Guidelines (Coastal Resources Commission, 1975). A more refined approach to the classification of rural lands was needed in Aurora. By studying the existing land use patterns and intrinsic suitability in the planning area we were able to distinguish three types of rural land. *Rural One* was land suited for hardwood forest, that provided excellent wildlife habitats and needed to be protected for those uses. *Rural Two* included land that was in productive agricultural or forestry use and also needed to be protected to ensure that cultivation could continue as the primary use. *Rural Three* was land that, because of its location, and other characteristics, had good potential for mining. This rural land classification scheme became a basic element of the Land Use Plan. Public attention was directed toward the mining-related aspects of the Plan such as the rural land classification system. But Aurora also had other problems. A substantial amount of the planning and analysis effort became oriented toward in-town problems such as poor housing conditions in some neighborhoods; inadequate health care and facilities; deterioration of the main street business district; lack of water and sewer lines in some neighborhoods; and the need for a community multi-purpose center.

In general, the Aurora Land Use Plan sought to balance the interest of phosphate mining and the goals and objectives of Aurora within the constraints of the coastal environment. The Plan was adopted by the Town Board upon recommendation of the Planning Board in the fall of 1975. After adoption, work began on projects that could implement the Plan.

"A SUBSTANTIAL AMOUNT OF THE PLANNING AND ANALYSIS EFFORT BECAME ORIENTED TOWARD IN-TOWN PROBLEMS..."

IMPLEMENTATION EFFORTS

In the fall of 1976, Aurora received word from the Department of Housing and Urban Development that its application for a Community Development Block Grant had been approved. This $420,000 grant would provide the initial financial resources needed to begin implementation in several areas that had been identified by the Land Use Plan and Goals. This was an important event for Aurora because it allowed the interest which had evolved during the planning process to focus on projects that would significantly contribute to achieving several of the stated goals and objectives.

COMMUNITY DEVELOPMENT PROGRAM

The Aurora Community Development Program was formed in September, 1976 and I was hired as its Director. The tasks were clear and followed directly from the adopted Plan: rehabilitate houses, pave roads, lay water and sewer lines in two target neighborhoods; acquire a large old house and its two-acre lot for use as a multi-purpose building; and financially

assist the construction of a local primary health care center. A citizens advisory group made up primarily of citizens from the two target areas was appointed by the Town Board. This group of eleven people served, in effect, as a 'local guide' through the intricate pattern of local and neighborhood politics and characteristics. A federally-funded community development program was a new and unknown entity to residents in Aurora's target neighborhoods. People were of course pleased that the program had been funded but they were also somewhat apprehensive and skeptical about its implementation. Many, especially target neighborhood residents took a 'wait-and-see' attitude. Not until the first sounds of hammer and saw were heard did they believe it was really going to happen. Some apprehension by local people was also evident largely because the funding source was federal, thus creating the inevitable regulations, assurances and similar requirements that were unfamiliar and often viewed as confusing. However, on balance, Aurora citizens saw this as an opportunity to solve some of their problems and realize several planning objectives. Additional funding from HUD has allowed the Community Development Program to continue.

"...AURORA CITIZENS SAW THIS AS AN OPPORTUNITY TO SOLVE SOME OF THEIR PROBLEMS AND REALIZE SEVERAL PLANNING OBJECTIVES."

The first house to be repaired under Aurora's CDBG program. Photo by Brian Benson

THE ZONING ORDINANCE

Another major element in the implementation of the Land Use Plan was the zoning ordinance that would enforce the Plan. Preparation of the zoning ordinance also began in 1976 and carried over into 1977 with funding from a CAMA implementation grant provided by the National Oceanic and Atmospheric Administration. A consultant, Robert M. Leary and Associates, was hired to assist in key aspects of this work. Specifically, the firm was to prepare the section of the ordinance establishing performance standards and permit processes for surface mining and other significant land uses. Since Aurora's CAMA Land Use Plan had already been prepared and adopted by the Town Board, it served as the basis for the preparation and application of the zoning ordinance. During this time the mining companies became concerned about the proposed regulatory treatment of surface mining in the Town's extraterritorial planning jurisdiction. The Aurora Planning Board began a review of each section of the new ordinance as drafts were completed. Mining company officials became a familiar sight at Town Hall and the Planning Office requesting copies of the minutes of these meetings. In a statement read at the public hearing, mining company officials described the ordinance as placing phosphate mining in a "negative light" and as an "undesirable use of the land" (*The Sun Journal*, February 27, 1977). Contrary to popular opinion at the time, the ordinance was designed *not* to prohibit surface mining in the Town's planning jurisdiction but rather to place certain performance standards on its operations. Standards were developed for noise, glare, and vibration. Additional standards were developed for the land reclamation process that followed the excavation activities. Although the State places certain reclamation requirements on surface mining, the planners believed it was important for the Town to set and enforce its own standards.

The Aurora Zoning Ordinance also created a Downtown Area Development District to help encourage the revitalization of the Main Street business district. A Conservation District was applied to the fragile coastal environments that had been identified in the Plan.

On February 23, 1977 the Aurora Town Board adopted the new zoning ordinance-- it has remained in effect since that date.

LEARNING FROM AURORA

The Aurora planning and community development process, in addition to helping the Town establish and meet several goals, also yielded benefits for those individuals involved. There was a certain hopefulness about working in Aurora that things could change in visible and substantial ways and that progress could be

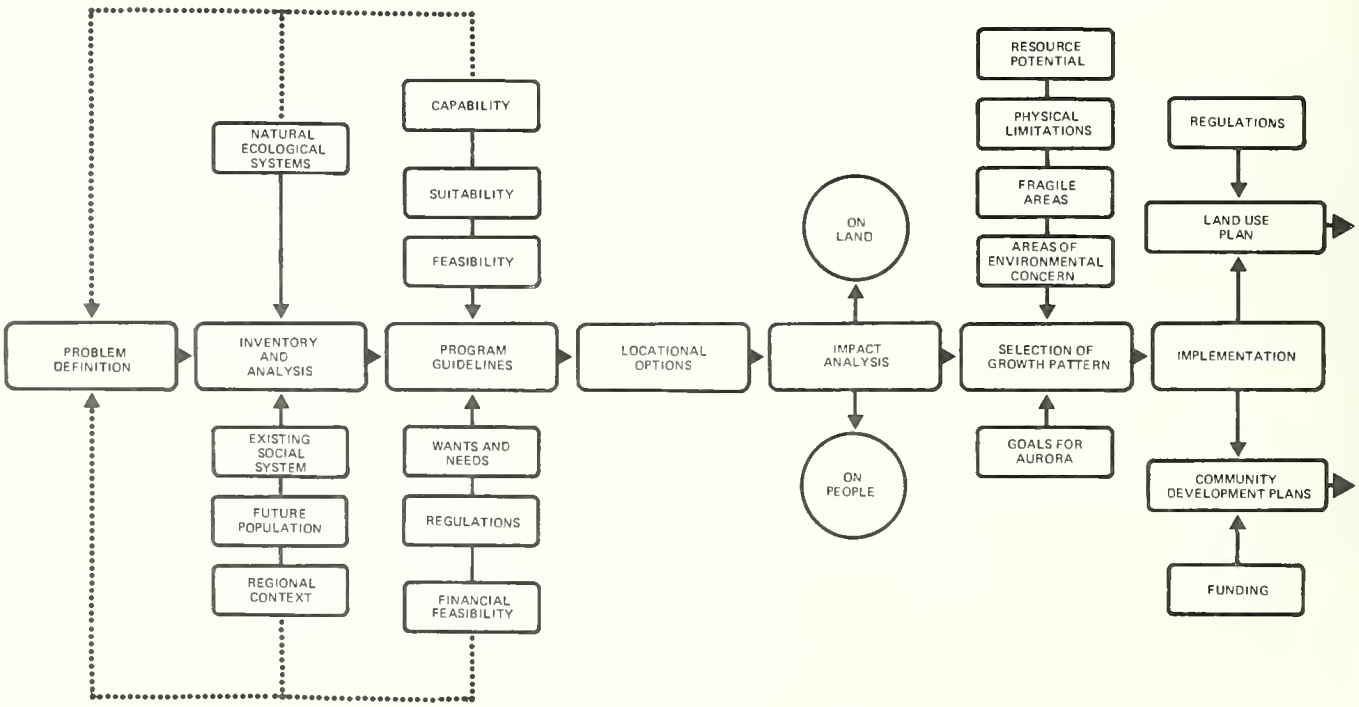
made in ways that mattered to townspeople. As a result, the planning team came away with many vivid impressions about planning for a small town. Many of my impressions have been reinforced and refined somewhat by experience elsewhere. The following can only be described as impressions however, and not techniques, although some may suggest certain approaches to solving problems in a small community:

1. *Active leadership* There appears to be no substitute for strong, active leadership. The community benefits when its elected leaders are willing to find out about problems, review alternative solutions and then seek out resources to implement solutions. This obviously rational process is, in fact, not a simple task. Problems facing small communities are often highly emotional and political. Such issues include poor housing conditions, inadequate health care, discrimination, a local economy based on a single industry and others. Many communities when faced with such problems tend to avoid them because of anticipated controversy. Others like Aurora, which are fortunate to have good leadership, work to solve problems rather than avoid them. It is within this type of local political atmosphere that planning and community development can be most effective.

2. *Sensitivity to the local social environment* It is important to develop an appreciation of the social and political environment, within which local attitudes are formed, that goes beyond statistical analysis. The problem is that the local social framework and the decision-making process that emerges, is difficult, if not impossible to fully understand in a traditional analytical way. It defies flowcharting or quantitative analysis probably because the local decision-making process is not highly structured. Rather, it is non-sequential, amorphous, subjective and constantly changing. However, it is important not to dismiss this existing process because it lacks structure -- it is critically important to the success of planning and community development. The primary task of planning in this area is to patiently begin introducing more rational and thorough decision-making strategies into the local process.

3. *Maintaining a clear vision* A complement to the need for an appreciation of the local social framework is a need to maintain a clear vision of the planning and community development objectives being sought. In an effort to design plans that are sensitive to local characteristics it is possible to become so involved in local conditions that objectivity is obscured. This means that the goals, objectives and policies must remain a vital part of the decision-making process. Keeping key elements in the planning process visible to the public tends to direct events along the desired path.

4. *Setting goals and objectives* In Aurora, setting goals and objectives had the effect of clarifying problems and needs,



The Aurora planning and community development process. Source: School of Design, 1976

thereby allowing public attention and effort to concentrate on identified courses of action. This encourages more creative problem-solving as an alternative to relying on traditional solutions.

5. *Need for clear information* Information presented to local decision-makers and others should be free of jargon and obscure language. Smalltowners though sometimes not sophisticated, can detect sloppy and disorganized thinking even if it is cloaked in technical sounding rhetoric. The approach to this situation is to avoid generalities and get to specifics about that place while emphasizing the results of good planning.

6. *Making the connections between policies, decisions and implementation* One key problem encountered when trying to implement planning is that local decision-makers do not always make the connection between stated policies and specific land use, zoning, or other related decisions. Their attention is focused on the individual case level, and not on the broad goal or more detailed policy. If the connection is made, it is often tenuous and highly dependent on the specific case. This situation is not necessarily bad and could very well lead to a more appropriate decision that balances unique circumstances against stated policy. Small town residents and leaders tend to frame land use issues and problems in terms of personalities rather than conflicting values or official policy. Therefore, it is important to keep the spirit of the goal or policy alive in the decision-making process as specific situations arise. The effect is that decisions have to made and issues addressed that might otherwise go without official attention.

7. *Data gathering* In Aurora the data-gathering process proved to be a valuable learning experience which went beyond the information compiled. The acts of sifting through previous research, old maps, analyzing survey data, conducting surveys, and doing fieldwork contribute to the understanding of a town and its people.

CONCLUSIONS

Most traditional planning methods seek to separate issues, problems and their various components for the sake of understanding. This is, of course, an important part of the planning process necessary for accurate understanding. To a large extent however, we found that this analytical process is countered by the tendency for these issues and problems to pull themselves back together. Planning issues and problems exist in an on-the-ground context and they exist in relation to other problems and issues. We believe that those who want to understand small towns in a comprehensive way must be able to modify preconceptions about the structure and nature of a place as a result of observation, study and thoughtful reflection. The characteristics that emerge must coincide with reality if planning is to be successful.

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Paul E. Hosier

Recreational Off-road Vehicle Impacts In Coastal North Carolina

North Carolina's beaches, once trodden by sunbathers, swimmers, fishermen, surfers, and beachcombers, are now overrun with a mechanical mode of enjoying the beach environment: the recreational off-road vehicle (ORV). In 1970, four-wheel drive vehicles were an uncommon sight; they were viewed as a novelty and an extravagance. Today, however, the spring and fall months are marked by lines of mobile sports-fishermen along the sandy beaches near Oregon Inlet, Cape Hatteras Point, Drum Inlet, and Fort Fisher Beach. At the first sign of summer, surfers, sunbathers, and swimmers stuff their boards, blankets, and lunches into dune buggies and race to the beach. Even beachcombers can now cover more beach area with a recreational vehicle, collecting shells and other coastal treasures on remote, previously inaccessible beaches.

This dramatic change in the use of the beach environment in North Carolina has not occurred without leaving its mark. Long stretches of pristine beaches now have off-road vehicle tracks; unthinking ORV enthusiasts have created crossovers and roads throughout the dunes and grasslands; local governments are required to expand manpower and expend money to control vehicle use at the shore. The ORV phenomenon has appeared suddenly; few county or local governments were fully prepared to deal with the vehicles and their effects. Some communities immediately banned ORVs; others developed ordinances specifically addressing how, when, and where recreational vehicles may be used on the beach. A few communities have yet to develop regulations related to off-road vehicle operation.

This paper describes how and where recreational off-road vehicles are used most intensively along the barrier beaches of North Carolina, discusses the effects ORVs have on the beach environments and organisms, proposes management guidelines for off-road vehicle use based on scientific research, and discusses the variety of ordinances now in effect in North Carolina.

POPULAR ORV BEACHES

In Currituck County, Currituck spit is characterized by a number of large dunes or medaños, similar to Jockey's Ridge in Dare County. The dunes have been exploited by off-road vehicle users. Hill climbing has been a favorite recreation in these deserted and nearly inaccessible areas. Vehicular impact on the unvegetated, migrating sand dunes has been largely superficial; however, acres of vegetated sand flats surrounding the medaños have been denuded by vehicles (Fig. 1). This activity has been nearly stopped with increased law enforcement, however violations continue to be noted on this unpopulated beach.

The twelve-mile beach in the Town of Nags Head is an area where extensive off-road vehicle use occurs. Local interests sponsor fishing tournaments to spark ORV use and the proximity of the town to Cape Hatteras National Seashore also makes this area attractive to, and well-used by, ORV enthusiasts. The conflict between concerned beachfront property owners and organ-

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Figure 1. The congregation of vehicles for hill climbs has denuded extensive area of vegetated flats surrounding the dune.
Photo by Paul Hosier

ized sports-fishing groups has created a potentially difficult situation within the town. Excellent ORV regulation enforcement has managed to minimize adverse recreational impacts.

Within Cape Hatteras National Seashore, the inlets and the cape act as magnets for mobile sports-fishermen. At Oregon and Ocracoke Inlets, vehicle traffic has compacted sediments along the unvegetated portions of the beach. Near Ocracoke Inlet, sand flat vegetation has been altered by ORV tracks. Chronic operation of ORVs has kept natural stabilizing vegetation from invading the flats. In the vicinity of Hatteras Inlet, southwest of Cape Point, an extensive network of sand roads has been created by ORV activity. Dunes and grasslands have been denuded and blowouts are evident. New roads are constantly established as old roads become impassable.

"NUMEROUS, EXTENSIVE DEEP SAND ROADS HAVE BEEN CREATED ALONG THE WIDE BERM ON THESE ISLANDS."

Portsmouth Island and Core Banks, now part of Cape Lookout National Seashore, have had a long and glorious history of off-road vehicle use. Sports-fishermen ferry old vehicles to the fishing camp concessions on the banks. From here, the vehicles provide the mobility necessary to take advantage of the 45 miles of beach open to fishermen. Numerous, extensive, and deep sand roads have been created along the wide berm on these islands. If the old vehicles failed to operate or became hopelessly bogged down in sand, they were often abandoned on the islands. Recently, the National Park Service contracted for the removal of nearly 2,500 vehicles from Core and Portsmouth Islands.

Emerald Isle, located at the western end of Bogue Banks in Carteret County, is an important off-road vehicle use area. For years, vehicles have traversed the beach, primarily for recreational fishing. During this period, no beach access areas were officially designated. ORV damage is evident where vehicles crossed dunes to reach the beach. One official access ramp now exists; the community is in the process of designating and improving other access areas.

West Onslow Beach has had a similar history of vehicle use. Vehicles use the unincorporated portion of West Onslow Beach. Illegal access was used until Onslow County recently designed access ramp sites. Lack of enforcement of vehicle regulations has resulted in some dune destruction at the beach.

Fort Fisher Beach, a portion of the Fort Fisher State Historic Site, is a major recreational off-road vehicle use area within North Carolina. The beach is publicly owned, however, little enforcement of ORV regulations has been attempted by state or local governmental units. Extensive dune and marsh destruction has occurred. The dune system is criss-crossed by sandy trails, and vehicles encroach upon the marsh along a three-mile section of the historic site (Fig. 2). During the summer, as many as 200 vehicles of all descriptions can be found along and throughout the beach, dunes, marsh, and sand flats. Hundreds of people use the area for recreational pursuits, including fishing, swimming, sunbathing, and shellfishing. We recently observed an individual water skiing along a sound-side creek--he was being pulled by a four-wheel drive vehicle.

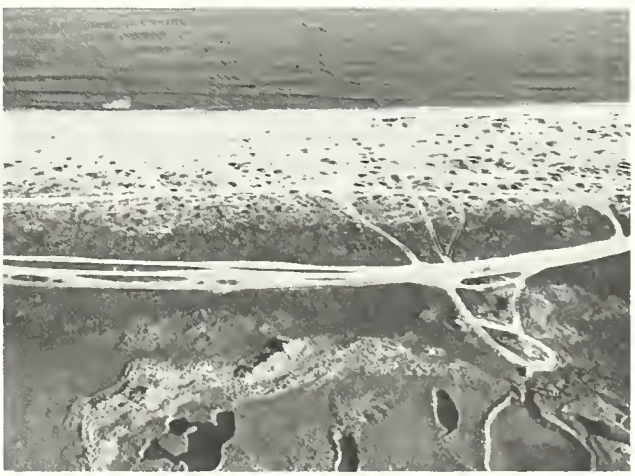

Figure 2. Lack of law enforcement allows vehicles to travel throughout the dune and marsh ecosystems.
Photo by Paul Hosier

OFF-ROAD VEHICLE IMPACTS IN THE COASTAL ENVIRONMENT

The barrier beaches which dominate the coastal area include a number of different environments which are affected by ORV use (Fig. 3). The natural processes and organismic composition of these units differ. The response to ORV impacts is variable, thus each major unit will be discussed separately.

The berm is the most dynamic system on the barrier beach. It includes the intertidal zone between low tide and the toe of the most seaward dune. This highly malleable environment can withstand the physical impacts of vehicles to the greatest extent of any system on the barrier beach. It is not, however, without impact. Both the fauna and flora of the area are vulnerable to vehicle impacts. Our studies at Cape Hatteras National Seashore and a study at Assateague Island, Virgina (Steiner and Leatherman, 1980), have found that ghost crabs (*Ocypode quadrate*) are vulnerable to vehicle operation. Where ORVs are present, crab populations are lower than in adjacent control or non-used areas. The amount of population change is related to the intensity of use. Areas near beach access ramps show the greatest decline in ghost crab populations. Direct vehicle kills of crabs do occur, especially at night; however, destruction of burrows and traffic stress are likely the main contributors to population reduction. Crab populations may be reduced as much as ninety-five percent in the vicinity of access ramps.

Environmentally concerned persons often cite ORV impacts on logger-head turtles (*Carettta caretta caretta*), an endangered species. Data are now being accumulated to support this contention. Use of headlights at night may reduce nesting success, since headlights deter female turtles from coming ashore to lay eggs. We have conducted a study to determine the effect of non-smooth beaches on hatchling movement to the ocean. The results indicate that turtle hatchlings are impeded from reaching the surf by microtopographic variations created by the action of pedestrian traffic or vehicle tracks. The longer time required for turtles to reach the surf makes them less likely to survive the trip; gulls and raccoons will find them easy prey.

At Cape Lookout National Seashore, our study has revealed that deep ORV tracks trap seeds of sea oats (*Uniola paniculata*) as they are blown across the beach. The captured seeds are subsequently buried by drifting sands. Germination of the seeds occurs following burial and lines of sea oat seedlings are visible along the upper beach. Later in the year, vehicles use the same beach for travel. Vehicle tires churn up the sand and expose the roots of the plants, thus destroying the seedlings they originally aided in planting.

The effect of ORVs on colonial nesting bird activity has not been documented in North Carolina. At Cape Cod National Seashore, vehicles passing through the colonies have been shown to kill birds and crush eggs. Along the North Carolina coast, we have observed dead birds in the tracks of ORVs. The nestlings usually seek protection from passing vehicles in the tracks of vehicles. The passage of subsequent vehicles through the same tracks results in the death of many birds. The pro-

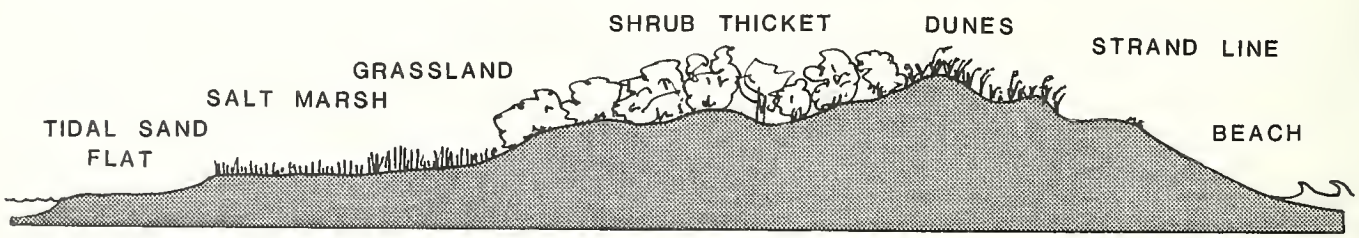

Figure 3. Generalized barrier island ecosystem diagram indicating environments most severely affected by off-road vehicle use.

Graphic by Paul Hosier

tective coloration of the birds prevents ORV operators from locating nestlings. The parent birds are often flushed by the passage of a vehicle or by pedestrians walking into the nesting area. The unprotected eggs quickly overheat without the parent birds and unhatched birds die.

Within dune and grassland areas, ORV impacts are severe. For example, at Fort Fisher, North Carolina, the dune system is traversed by vehicles, motorcycles and dune buggies. There, recreational vehicles without proper controls on their movements have destroyed significant areas of dunes. The non-cohesive nature of dune sands results in severe impacts by undermining and exposing plant roots and rhizomes, and by exposing sand to the forces of the wind. The most disturbing feature of ORV effects in the dune system is the extremely low level of impact necessary to disturb the vegetation and the sands. Our studies show that vegetation is completely destroyed on a dune with only 100 passes. One to five passes heal slowly and are visible for at least a year. Following disruption of the vegetation, wind action mobilizes the sand and enlarges the initial impact area.

Controlled impacts on dune systems indicate that 100 vehicle passes can reduce the vertical dune profile by as much as one foot. The amount and extent of damage will vary depending upon vehicle weight and speed, tire size, pressure and tread design, and slope of the dune.

Results of research at Cape Hatteras National Seashore indicate that only ten passes of a vehicle are sufficient to reduce plant cover in grasslands by sixty percent; while fifty passes reduces vegetation cover by ninety-five percent. Chronic impacts spaced weeks apart continually maintain low vegetation cover in these grassland areas. Recovery of affected areas is initiated by the invasion of annual plant species. These plants are gradually replaced by perennial grasses and forbs which re-establish a dense cover and extensive root network. With severe denuding, recovery is very slow. The vegetation within the dunes and grasslands at Fort Fisher Beach has been so severely altered by ORV activity that it will require intensive planting of grasses and the placement of sand fencing to assure dune development.

We initiated a study of ORV effect on the patterns of vegetation at Fort Fisher Beach (Hosier and Eaton, 1980). A number of vegetative and physiographic parameters were measured. Significant differences between ORV-impacted (Fort Fisher) and control (Bald Head) beaches were found (Table 1). The number and diversity of species were lower on the ORV-impacted beach, and the areal extent of grasslands was decreased. Total vegetation cover on the dunes showed nearly a fifty percent decrease at Fort Fisher Beach when compared with the control. These changes are detrimental to the stability of the island. Oceanic overwash during storms will likely be more severe following devastation of dunes and grasses if vehicles are allowed to continue to use the area without restrictions.

In the same study, significant compaction of sandy substrates was detected. This alteration of the substrate tends to increase the water content of dry, sandy soils and may cause the formation of poorly drained sites, especially in the marsh. Salt pan formation may occur.

TABLE 1

Parameter	Dunes			Grassland		
	Bald Head	Fort Fisher	% Change	Bald Head	Fort Fisher	% Change
Species	15.00	13.00	-13.30	31.00*	12.00	-61.30
Aerial extent (%)	51.28	82.87	61.60	48.72	17.17	-64.80
Vegetation cover (%)	19.39	10.58	-45.40	53.29	38.53	-27.70
Unvegetated quadrats (%)	4.30	22.73	428.60	0.00	0.00	0.00
Species diversity	0.9482	0.8386	-11.60	1.0320	0.7436	-27.90

*Includes two species observed, but not found in quadrats.

Summary statistics and percentage change for dune and grassland vegetation on non-impacted Bald Head Beach and ORV-impacted Fort Fisher Beach.

Studies of the effects of off-road vehicles in the American desert have indicated a decrease in population of all animal species studied (Busack and Bury, 1974 and Bury et al., 1977). At Fort Fisher, we conducted a study to assess the effects of vehicles on small mammal populations, primarily rats and mice. Their density was determined on the affected barrier beach and the unaffected barrier beach. Despite the intrusion of vehicles and the destruction of dune, grassland, habitat, and food supplies, mammal populations were higher on the affected barrier beach (Table 2). Based on a survey of predatory animals, we found no foxes or snakes on Fort Fisher Beach indicating the lack of normal predators on the ORV-impacted beach. The highly adaptable mice and rats are probably able to withstand the intrusion of the vehicles into their habitat with greater success than the animals which prey upon them. As a result, their populations are unchecked by predatory activity.

TABLE 2

Animal Species	Number of small mammals/ 100 trap nights	
	Fort Fisher (ORV impact)	Bald Head (No-ORV impact)
House mouse *(Mus musculus)*	1.86	0.68
Rice rat *(Oryzomys palustris)*	1.72	0.87
Cotton rat *(Sigmodon hispidus)*	0.07	0.00
Total captures/ 100 trap nights	3.65	1.55

Comparison of small mammal captures on ORV-impacted and control beaches during four sampling periods from December 1979 to October 1980.

RECOMMENDATIONS

Based upon the results of off-road vehicle research, we propose several measures to mitigate or eliminate the negative impacts of ORVs on barrier beach environments of North Carolina.

1. *ORV use should be restricted to the intertidal wet sand environment.* Vehicles should be prohibited from using the area near the toe of the foredune and the strand line portion of the beach. Beaches and inlet zones which are prograding should be closed to ORV use. Vehicles crossing these areas destroy developing dune vegetation. This activity either produces or maintains an unstable beach. Sections of the beach which are narrowed by erosion and/or exhibit a steep profile should be closed to traffic, since at high tide, vehicles must intrude into the dunes to gain passage.

2. *ORV use on intertidal beaches should be suspended from 1 May to 15 October.* Closing the beach to vehicles during the summer season will diminish animal mortality and reduce conflicts between ORVs and pedestrians. Ghost crabs are most active from late spring until early fall. Similarly, loggerhead turtle nesting occurs from early May until early August and loggerhead turtle hatching continues into early fall. Both organisms will benefit from closure. ORV intrusions upon pedestrians will be virtually eliminated by suspending ORV activity during the summer months.

3. *Colonial bird nesting areas on the open beach should be clearly marked.* Vehicles should be prohibited from entering or crossing nesting areas. Vehicle trails should be routed around nesting sites as they are identified. Inspection of nesting areas by people on foot should be discouraged. Interpretive programs explaining the importance of maintaining nesting bird colonies should be implemented.

4. *ORVs should be strictly prohibited in coastal dunes.* Vegetation destruction, animal habitat alteration, and substrate changes caused by ORV operation in the dune system should be eliminated. Older dunes located away from the beach are exceedingly vulnerable. Without accreting sand, dune plants do not grow rapidly. Re-establishment of vegetation in these areas is a very slow process.

5. *ORV crossovers should be constructed with a protective surface, spaced widely along the beach, and carefully sited to reduce the potential for blowouts.* Wooden or aluminum mats are excellent materials for crossover construction. The natural contours of the dune system should be maintained during the construction process. Dune swales or saddles should be avoided in locating crossovers. Since the beach and dunes in the vicinity of crossovers are severely impacted by vehicles, a minimum number of crossovers should be constructed along a section of beach. This will concentrate the most severe impacts in a few sites (Fig. 4).

6. *Vehicle trails through vegetated areas of dunes and grasslands should be constantly maintained and graded.* Fort Fisher and Hatteras Inlet offer excellent examples of the problems created by minimal trail maintenance. Sandy roads quickly become rutted and then flooded without constant maintenance. When a section of a trail becomes impassable, new trails are blazed. The resulting network of trails increases the extent of damage to vegetation and wildlife.

7. *Fencing, planting, and posting can be used effectively in restricting or eliminating vehicle use in specific areas.* Our research has involved closure of specific trails and areas to assess vehicular impacts. With posting of explanatory signs and fencing or posts, vehicle users are likely to respect the closed areas. Revegetation of denuded trails will make users less inclined to violate the area; this will speed recovery.

8. *ORVs should be prohibited from crossing salt marsh and tidal sand flats.* Based upon studies conducted by Brodhead and Godfrey (1979), a few passes by a vehicle are sufficient to create persistent deep ruts in a peaty salt marsh. These ruts can alter drainage patterns within the marsh and create salt pans. Our studies indicate a similar result when sediments are compacted by vehicle traffic. Organisms in the tidal sand flats were crushed or otherwise reduced by off-road vehicle activity in New England studies. Corresponding effects can be anticipated for North Carolina tidal flats. Godfrey et al. (1977) have discussed guidelines for ORV use based on studies at Cape Cod National Seashore. A number of management concepts discussed in the paper apply to North Carolina barrier beaches.

Figure 4. Using wooden or aluminum crossover mats can reduce the impact of vehicles on the dunes.
Photo by Paul Hosier

OFF-ROAD VEHICLE ORDINANCES

Many coastal communities have passed local ordinances which address the use of ORVs within their jurisdiction. They range from well researched, well documented, and thorough ordinances to superficial, expedient, unenforceable ordinances. Local legislation is highly variable, often reflecting a community's perception of appropriate use of ORVs based upon the level of input from ORV users and individuals and groups opposed to vehicle use. For example, some ordinances specify a closed season. Closing dates for ORV use vary from Easter Sunday at Ocean Isle to 1 June at Indian Beach.

"THE UNEVENNESS AND VARIABILITY OF ORV REGULATION AND ENFORCEMENT IS DISTURBING."

Opening days similarly vary. In Carteret County, the beach opens for ORV use on 1 September; in Nags Head, opening day is 1 October. The National Park Service (Cape Hatteras and Cape Lookout) does not recognize a season. Instead, at Cape Hatteras, specific sections of the beach are closed to traffic to avoid conflicts with swimmers and bathers.

Ordinances differ in the types of off-road vehicles allowed on the beach (Hosier and Eaton, 1979). The Town of Nags Head allows only four-wheel drive vehicles, while the adjacent Cape Hatteras National Seashore permits all four-wheeled vehicles. Onslow County allows all four-wheeled and three-wheeled vehicles, but bans motorcycles. Atlantic Beach allows all two-, three-, and four-wheeled vehicles without discrimination.

Speed laws vary from fifteen miles per hour at Holden Beach to twenty-five miles per hour in Currituck County and Nags Head. Many ordinances do not specify a speed limit. Permits and fees are established locally and are not consistent state-wide. Nags Head requires a permit with a fee of twenty-five dollars; Surf City and Holden Beach require a fee of ten dollars. Cape Lookout and Cape Hatteras National Seashore require a permit, but no fee.

Both Currituck and New Hanover Counties expressly forbid hill-climbing and beach-racing; in Dare County, commerical fishermen are given special exemption from ORV regulations; the Town of Nags Head forbids night-driving and specifies that North Carolina motor vehicle laws be enforced, including driving under the influence and reckless driving.

Enforcement of existing ORV laws exhibits considerable variation. Nags Head town police patrol the beach several times a day, citing violators when necessary. At Fort Fisher State Historic Site, confusion over law enforcement

responsibility and jurisdiction has led to the complete lack of patrol or law enforcement. The unevenness and variability of ORV regulation and enforcement is disturbing. Local governmental and state-wide management and enforcement agencies have been slow to respond to the rapid development of the ORV problem in the coastal area. The speed with which the ORV phenomenon occurred caught state and local government personnel without sufficient resources or information concerning the impact of vehicles, and few resources for controlling impacts.

"THE BARRIER BEACHES WHICH DOMINATE THE COASTAL AREA INCLUDE A NUMBER OF DIFFERENT ENVIRONMENTS WHICH ARE AFFECTED BY ORV USE."

THE FUTURE OF ORV USE

What does the future hold for recreational off-road vehicle use in North Carolina? First, unless a severe oil crisis reduces gasoline supplies, vehicle use will probably continue to increase. Sports-fishing is becoming increasingly popular as a recreational outlet. Second, ORVs are here to stay. Given the political, economic, and social climate of the coastal area, those who benefit from ORV use will not submit to a total ban on ORV beach traffic.

Explicit regulations will be required to manage ORV use on the beach. Scientific studies should be continued, primarily to determine how ORV impacts can be mitigated. Scientific input can be used to continually update off-road vehicle regulations and reduce negative impacts.

On a larger scale, ORV use should be assessed and monitored at the regional and state levels to determine the impact of vehicles. Thorough planning is necessary to insure that the ORV user can enjoy the beach without infringing on the rights of property owners and other beach users. This will be no easy task. It will require compromise from both sides of the ORV issue.

Photo by Paul Hosier

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Neil Caudle

Tradition and Change In A Coastal Fishing Village

One evening in September 1933, Irvin Guthrie walked out of his house and felt water rising around his ankles. A huge storm, one of those nameless but historic hurricanes, was shoving back water up in Back Sound, flooding Harkers Island.

"Up in the road, somebody had a lamp lit," Guthrie recalls. "People were tying themselves together with a long rope so nobody would be lost. They were heading for higher ground."

The swollen sound had split the land barrier and carved a new inlet between Cape Lookout and Shackleford Banks. The inlet released the flood waters and spared Harkers Island. The islanders untied themselves and went home. The hurricane had swept Guthrie's house off its foundation, but set it down whole. His neighbors helped him lift it back astride its underpinnings.

"Only thing is, the doors and windows never fit just right after that," Guthrie says. "Things just don't hold a straight line."

For Guthrie, that September night marked a turning point in the life of Harkers Island. It was, he says, almost as if when the water rushed out, the twentieth century rushed in. The inlet made it easy for sports-fishermen and tourists to use the island as a jumping-off place, and brought about more change, Guthrie believes, than the bridge to the island which was built in 1941.

"When I was born here in nineteen-o-one, there were less than a hundred people living here," he says. "And everybody at the time made a living out of salt water."

Today the population of Harkers Island is 1651, and the old fishing and boat-building traditions are in trouble. Says Jim Sabella, an anthropologist at the University of North Carolina at Wilmington: "If you go to Harkers Island with the notion that you're going to find this quaint, old-timey fishing village, forget it. It's just not there. It's only when you've lived there for a while, and you get to know the families, that you see the older way of life coming through."

It is a way of life that lures young people home from the cities and attracts outsiders into rustic retirements spent among boats, nets, and porch swings.

Sabella and his research associate, Marcus Hepburn, have just completed a two-year Sea Grant study of the island. They wanted to be able to tell the agencies regulating the state's fisheries something about the people they are regulating -- their values, their history, and their culture. But Sabella and Hepburn also wanted them to know what is likely to be left of places like Harkers Island when the twentieth century gets through with them. They wanted to make sure that any planning and management strategies for the coastal region could take into account the social and cultural resources, as well as the physical resources, of the area. Harkers Island was chosen for the study, Sabella says, because it is in many ways representative of the state's fishing communities.

"There, in a relatively small space, we could look at many different types of fishing and many different sizes and types of fishing craft," Sabella says. "The same kinds of fishing are done in other parts of North Carolina, but not all of them in the same place. And, of course, the boat-building is there as well."

Harkers Island's fishing tradition began in several nineteenth-century fishing and whaling communities on Shackleford Banks -- villages like Edge of the Woods, Mullet Pond, and Diamond City. Many of Harkers Island's ancestors settled the island after a series of storms between 1850 and 1900 drove them off Shackleford. Defining the role of fishing in the community was a primary concern of the researchers. Fewer than half of the 143 commercial fishermen on Harkers Island fish full-time; the rest piece together incomes from boat-building or outside jobs. But though they are few in number, the fishermen show a great diversity in the ways they work, trawling, dredging, netting, raking, kicking, hooking, and tonging almost everything that swims in the salt.

Harkers Island fishermen have a reputation for inventiveness. In the 1930s they developed, apparently independently of other regions, the technique of channel-netting for shrimp. The

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A commercial fishing boat leaves Harkers Island at dawn, heading for a day's work.
Photo by Steve Murray

practice was almost unknown elsewhere on the East Coast until recently, when fishermen to the south became attracted by the fuel-saving advantages of the net. A channel net is "set" in place and relies on the flow of tides, not the pull of a boat, to trap the shrimp.

The islanders have developed a system of self-regulation regarding the fisheries. A rigorous set of unwritten laws governs the use of prime channel-netting locations -- laws enforced primarily by social pressures within the community. Sabella and Hepburn found similar regulation in the long-haul and long-line fisheries. Captains of long-haul crews meet informally at the beginning of each season and list the best fishing locations. They assign a sequence that allows the crews to rotate through the best fishing locations.

Partly because they are accustomed to regulating themselves, the fishermen of Harkers Island view governmental agencies with suspicion. Responding to a survey that asked who they thought had the most influence on fisheries policy-making, the Harkers Island fishermen placed commercial fishermen last among five groups. Officials from North Carolina's Division of Marine Fisheries, however, said that they weigh the fishermen's opinions higher than all other groups but one, the seafood dealers.

Increasingly fishermen and officials agree on the best ways to publicize new policies, and, in some cases, Harkers Island fishermen have even begun to ask for more state regulation. Sixty percent of the commercial fishermen surveyed wanted the state to outlaw clam-kicking, which has been suspected of damaging shellfish nursery areas. As Sabella points out, many of the new problems facing fishermen -- competition from sports-fishermen, rising fuel costs, pollution and scarce supplies of some species -- are beyond the fishermen's control.

Ben Brooks, a Harkers Island native who fishes commercially full-time, believes that his way of life is in serious trouble, largely because of the scramble for new gear, bigger boats, and bigger catches.

"You have to go harder to make a living," he says. "You have less leisure time. You could have a certain trawl this year, catching shrimp, and next year somebody could pop up a new idea, and the following year, you'll probably have to get a new trawl."

"The thing you have to ask yourself is, will we continue to have small fishing operations?" Marcus Hepburn says. "It could go the route of agriculture: bigger business units, bigger boats. And if that happens, the Harkers Island fishermen won't be able to adapt. They enjoy their independence and won't give it up."

But Sabella and Hepburn point out that, even if they lose their boats tomorrow, fishermen on Harkers Island won't be helpless.

"These people have a wide range of skills," he says. "A lot of them have built their own homes, in addition to their own boats. They do electrical work, they do mechanical work, they work with hydraulics. They are rich in ability and intelligence, and they're perfectly capable of taking care of themselves."

Most of the Island's fishermen assume that fishing has a future there. Even so the pressures are making some islanders think twice. In a study of how fishermen's wives regard their lives and their husbands' careers, Sabella and Hepburn found that almost half of the women surveyed were opposed to their sons becoming fishermen. But, as Sabella points out, "the women are very supportive of their husbands, in the sense that they

realize that the men are happy on the water, that they are their own bosses, that nobody interferes with them, and that it's a good life."

"The fishermen's wives almost unanimously said that their lives were tougher than other women's," Sabella says. "They think that fishing is not adequately rewarded, financially. But that still doesn't mean, when everything is said and done, that they wouldn't rather stay in fishing."

Whatever the hardships, Sabella found that an extraordinary number of the island's daughters chose to remain there. Joann Brooks, who was not raised on the island, but inherited the life there when she married Ben Brooks, expresses it this way: "There's a closeness that you have over there that you don't have other places." Fishing on the island cannot be clearly understood, Sabella points out, without an understanding of the boat-building there. Many fishermen build boats; most boat-builders fish; and each group needs the other.

When Ebenezer Harker bought what was, in the mid-1700s, called Craney Island, he listed his occupation as "boatwright;" but if boat-building took root on Harkers Island with Harker, it lay dormant until Brady Lewis started a small boat-yard in 1926. It was a natural match. Fishermen needed boats, and the material -- Atlantic white cedar lumber -- was handy. Boat-yards sprouted and refused to die, even in the face of competition from big companies manufacturing boats of fiber glass and metal. Today, there are 41 people building boats on the island, many working in their back yards.

Like most of the builders, 72-year-old Earl Rose has spent as much time fishing as he has building boats. What he has learned about fishing has often found its way into refinements in his boats. Once, there was all the business the island's boat-builders could handle, Rose says. Not so this year. The boatworks on the island, he explains, are being squeezed by high fuel costs, labor costs, and interest rates; yet Rose is unimpressed by arguments that wooden boats and craftsmanship are out of date.

"There will always be people who want wooden boats," he says. "There lays a boat right off yonder that is about forty-three years old, and it's still a good work boat. The man uses 'er in the roughest kind of weather, in the ocean."

Nevertheless, there is concern that boat-building on the island is far from healthy. One factor is lumber, which is becoming scarce. Most of the island's boat-builders say that if the lumber runs out they would quit building rather than switch to some other material.

Traditions, like nets, are well-tended. Families cling together. Churches are abundant. The community has always convened for informal, cooperative enterprises. An annual pony-penning on Shackleford Banks, during which islanders brand new foals, has survived for generations. Islanders share not only their brogue, but also a rich oral history and a singular tradition of folklore, folk medicine and local idioms. Sons grow up working side by side with fathers, uncles, and cousins. Fishing and boat-building skills are passed along through informal apprenticeships.

However rich the traditions, there are signs that their grip on the island is weakening. The islanders have kept their personal independence, Hepburn says, largely because of their ability to remain almost self-sufficient in an age of specialization and dependence. Many of the islanders can recall living for months without any need for money. Supper was waiting in the sound. There were no electric bills. No paying job called them away from a boat that needed repair or a neighbor who needed help. Most of that has changed. To compete, fishermen are buying bigger boats and going more deeply into debt. Fuel is suddenly a major expense. The cost of real estate on the island, thanks to the swelling population, is approaching big-city prices, so that young people who try to buy their own place face dizzying mortgages.

The islanders have found that debt and mortgages demand substantial, reliable incomes, which a fisherman or boat-builder finds hard to come by. Sabella and Hepburn speak of fishing and boat-building as the two traditions most critical to the old way of life on Harkers Island. If they fall, the chain of 'vocational succession' will be broken. Such a collapse of the island's social structure is a greater threat to the way of life there than tourism. Some residents have been alarmed about what they believe will be an invasion of "dingbatters" (tourists and recreational fishermen) if the National Park Service follows through on its plan to build a visitors' center on the southern end of the island. Others are reassured by the Park Service offer to route tourist traffic around the heart of the island.

Sabella and Hepburn will not try to predict the future of Harkers Island. But in an era when it is fashionable to speak of waters, earth, and forests as "resources," Hepburn and Sabella point out that the way of life on Harkers Island is a resource as well -- a cultural resource that has given the islanders satisfaction for generations; and, because North Carolina's fishing communities are similar, the things that threaten Harkers Island are likely to affect other fishing villages, where the way of life, often equally revered, is facing the same abrupt intrusion of development, tourism, and change.

David Owens

The Future Of The Currituck Outer Banks

One of the most controversial natural resource management issues in North Carolina over the past ten years has been the debate surrounding the future of the Currituck Outer Banks. As one of the last remaining undeveloped and privately owned barrier island stretches on the East Coast, this debate has taken on national significance. Unlike many similar controversies, planners have played a central role in this debate, and a comprehensive planning philosophy is being followed to determine the outcome. The resolution of this issue has not come about in traditional ways -- there was neither a pitched battle between environmentalists and developers nor an invisible decision by government bureaucrats. Rather, it was a test of the state's new comprehensive coastal management process. Some important lessons regarding the role of planners and government decision-making on complex resource management issues can be learned from this experience. The future of the Currituck Banks, which will not be finally determined for several more years, lies in how well these lessons have been learned and applied.

THE SETTING

The Currituck Outer Banks is a long, narrow sand spit in the extreme northeastern corner of North Carolina. The Banks are about twenty-three miles long, extending from the Virginia border south to the site of the former Caffey's Inlet, now the Currituck County border with Dare County. The Banks are only 2,000 feet wide at some points and two miles across at the widest point.

The Banks have a typical east coast barrier island profile -- ocean beaches, low frontal dunes and hummocks, secondary dunes and sand flats, large migrating back dunes, maritime forests in the wider sections, and extensive marshes on the sound side (Goldsmith, 1977).

Being at the transition point between northern and southern vegetation groups, the Banks have an interesting and complex vegetative cover. There are over 200 different species of plants, some at their northern extreme (sea oats), others at their southern extreme (bayberry and American beach grass). There are at least ten species of endangered or unusual plants and animals found on the Banks, including loggerhead turtles, bald eagles, and Peregrine falcons (Hosier and Cleary, 1979; U.S. Fish and Wildlife, 1980: 82-109).

There have been several wide but shallow inlets on the Banks, at times making this a true island (Stick, 1958: 1-10). In fact, Currituck Inlet set the boundary between Virginia and North Carolina in 1663. However, the last inlet, New Currituck, began filling in the late 1700s and closed completely in 1828. Prior to this, the Currituck Sound, the wide, shallow body of water between the Banks and the mainland, had high salinity and large shellfishing beds. With the closing of the inlet, and the diversion of water-flows out of the Currituck Sound, the Sound rapidly became almost fresh water in the 1800s, and now has a low salinity percentage.

The Currituck Banks have been inhabited since at least the 1650s. While there were no known Indian villages on the Banks, there is an Indian burial ground on Monkey Island in Currituck Sound. Several small fishing and farming villages were established on the Banks in the 1800s -- Wash Woods, Pennys Hill, Corolla, and others. An additional source of income for residents was provided by the U.S. Lifesaving Service. Following several disastrous shipwrecks, the Service in the mid-1870s established five lifesaving stations along the Currituck Banks and completed the 156-foot tall Currituck Lighthouse in the village of Corolla in 1875.

A peak in use of the Banks came in the late 1800s and early 1900s with commercial fishing and hunting and the growing popularity of hunting clubs. Starting with the establishment of the Currituck Shooting Club in 1857 large tracts of land were assembled to provide waterfowl hunting areas for the wealthy club members. Several of the clubs established beautiful clubhouses, with the Whalehead Club in Corolla being particularly noteworthy. These large holdings (e.g., the Pine Island Club owned four miles of the Banks, ocean to sound) remained intact until the 1960s and played a key role in deciding the future of the Currituck Banks. The last major period of settlement came during World War II, when an influx of servicemen swelled the population of Corolla to over 300. After the war, population declined steadily until the 1970s. There are now only approximately fifty permanent residents on the Banks.

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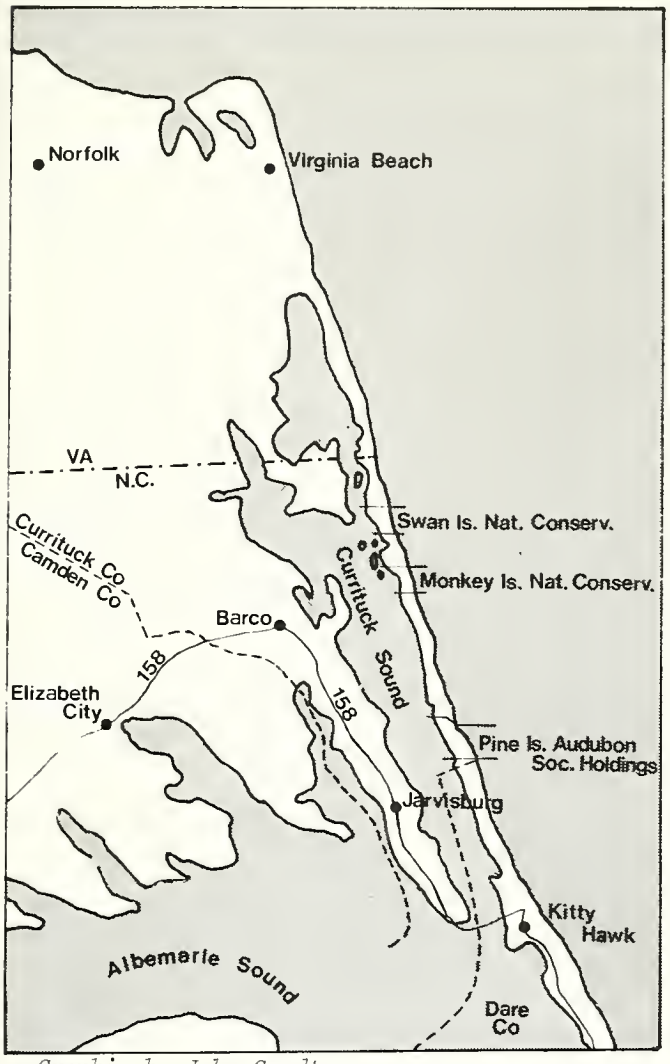

Graphic by John Gaadt

Despite the closing of the inlets and the proximity of the area to Norfolk, the Currituck Banks have remained largely undeveloped, unlike the beach areas of Virginia Beach to the north and Kitty Hawk-Nags Head to the south. This is primarily because there has never been an improved public road to the Banks. Access from the north was blocked when the U.S. Fish and Wildlife Service bought the Back Bay National Wildlife Refuge six miles north of the state line in 1938. The Wildlife Service has always resisted construction of a road across this refuge. In the 1970s the Wildlife Service halted access even along the beach; they could do this legally since they had purchased the beach-front down to the mean low water line.[1] In fact, since January 1, 1980, only permanent Banks residents have been allowed to drive along the beach through the refuge. Public access from the south has also been blocked. While a road to Corolla from the south was shown on the state highway system map from 1939 to 1974, no improved road was ever constructed.[2] Developers closed off the informal trail that did exist in 1975. That action was unsuccessfully challenged at the trial court level but is still on appeal (*West v. Slick*, 75-SP-37 (Pasquotank Co., N.C. 1975)). A private road for the exclusive use of landowners and permanent residents was built by developers in the mid-1970s, but it is closed to the general public.

FIRST ATTEMPT AT PLANNING THE FUTURE

The future of the Currituck Banks as a relatively undeveloped hunting preserve for the wealthy few was challenged in the late 1960s. Several of the hunt club tracts were sold to developers, who began to lay out typical grid subdivisions and to sell off small lots to thousands of individual buyers.

Currituck County, one of the state's smallest and most rural counties (without a single incorporated village), was totally unprepared in 1970 to deal with the impending massive development. The county had no land use plan, only rudimentary land use ordinances, no public water or sewer plans, no open space or park plans -- in short, none of the modern tools for managing land development. The state was similarly unprepared. Passage of the state Coastal Area Management Act would not come until 1974, with its land use planning and permit programs coming on line only in the late 1970s.

Still, the county and the state recognized the developing problems and took forceful action to deal with them. In the summer of 1972, the county adopted a one-year moratorium on subdivision approvals and embarked upon a major comprehensive planning effort. The state agreed to make Currituck County a pilot project for its emerging coastal planning efforts. Governor Bob Scott appointed an eleven-member interdepartmental committee to work with the county and significant funds were secured to finance a sophisticated planning effort.

The planning effort that followed in 1972-73 was widely hailed at the time as the model for sensible resolution of coastal land development problems. Since the county had no professional planning capabilities, a planning and design firm in Raleigh was hired to provide technical planning services. This firm largely designed the planning process and prepared all the technical reports (Batchelor, 1973). Detailed papers were presented on the development situation and potential.

The 1973 plan for the Banks included several key features. First, the area was to be developed as a destination beach. Therefore, no north-south access was to be provided. Access would be via ferry from the mainland. Second, rather than grid-type development with individual wells and septic tanks, development was to be in rather high-density clusters, with

central water and sewer and large open spaces. And third, a large area in the central portion of the Banks was to be acquired as a park.

The state endorsed these recommendations. The secretaries of the Departments of Administration, Natural and Economic Resources, Transportation, and Human Resources all signed an agreement in early 1974 endorsing the basic principles of the 1973 plan.

What happened is still the subject of debate and confusion. The developers made an offer of cash and land, which together they valued at $1 million, to implement the ferry system. However, the state was involved in some major personnel shifts, including the installation of a new secretary for the Department of Transportation, which caused delays in formulating a response. Jim Holshouser was entering the final two years of his governorship. As the only Republican governor of the state in this century, and the last governor without the power to succeed himself, his ability to hold matters together on this complex and controversial issue began to slip. Some of

"THE STATE AGREED TO MAKE CURRITUCK COUNTY A PILOT PROJECT FOR ITS EMERGING COASTAL PLANNING EFFORTS."

the developers, sensing changes in the participants' competitive positions, began to back away from their earlier support of the comprehensive plan. And the problem of securing the money to implement key portions of the plan began to appear insurmountable. The costs of implementation to state government were relatively high. The estimate for a single ferry was $1 million in initial costs and $250,000 a year in operating expenses. The costs of acquiring a public park in mid-county were in the $1.5 - $2 million range. It soon became clear that in the face of these considerable obstacles, the state would not be able to fully carry out its part of the plan.

For whatever reasons, the grand schemes of 1972-1974 collapsed. Public access, which was probably the critical factor for support by the county and the developers, was not provided and a park was not acquired. The county, seeing the access plans collapse, felt it could no longer require developers to bear the high front-end costs required for cluster development with central water and sewer systems. So grid-type subdivisions with septic tanks were again approved for the Banks. The 1973 Currituck Plan was for the most part abandoned. Too much time had been spent on design concepts and general notions of proper development and too little time on realistic appraisals of how the plan was to be implemented. This plan met the fate of most others -- it was briefly admired and then put on the shelf.

SECOND ATTEMPT AT PLANNING THE FUTURE

In the years immediately following the collapse of the first planning effort, two major changes occurred on the Currituck Banks. First, by early 1979 there were six major subdivisions approved for the Banks. These contained over five thousand individual lots and an additional twenty-seven hundred townhouse units. About four thousand of the lots had been sold by the developers to individual purchasers, although few of the lots had actually been developed. There were less than two hundred structures, many simply temporary fishing shacks and trailers. Second, three large tracts had been set aside for preservation. The Nature Conservancy had acquired two of the old hunt club tracts in the central and northern portions of the Banks as nature preserves. The Monkey Island Club and Swan Island Club tracts, over three miles of ocean to sound property, were acquired by the Nature Conservancy in late 1977 with a $4 million grant from the Mellon Foundation. In 1978, the owner of the Pine Island Club property donated half of the tract, the southernmost two miles of the Currituck Banks, to the Audubon Society for use as a sanctuary.

These two facts had important implications for future planning efforts. First, given the number of lots already sold, wholesale replatting of the Banks would be virtually impossible. The existence of the subdivisions would have to be accepted as a given. Second, the Nature Conservancy acquisition generally ruled out the possibility of any north-south thoroughfare along the beach, something the county and state had consistently opposed since the early 1970s.

A third very important change which would greatly influence the second planning attempt was that everyone had been through the experience once before. Developing a comprehensive management program for the Currituck Banks was no longer a novel experiment. While the knowledge gained the first time around would be brought to the second effort, so too would all the frustrations and resentments that result from a failed plan.

The second planning effort got underway in late 1978 with two critical catalysts -- a renewed demand for public access and a new proposal for a wildlife preserve.

The new push for improved public access to the Banks came from Currituck County officials who wanted to diversify and broaden the agricultural economic base of the county. Renewing a tradition begun in the 1930s, the county board, in 1978, asked the governor to provide access to the area, preferably by bridge or ferry, but lacking that, by road from the south. The new and considerably more powerful governor was Jim

Hunt, a Democrat from the eastern part of the state. Governor Hunt was receptive to the petition and asked the Department of Transportation to prepare a report for his action on the issue. This renewed the Currituck Banks issues and the interested parties -- the county, the developers, the now land-owning conservation groups, and the state agencies -- all began preparing to assure the protection of their interests. It appeared that the traditional development versus conservation fight was about to ensue.

Just as everyone was gearing up to take on the access issue, a second major issue emerged. In early 1979, the U.S. Fish and Wildlife Service announced that they were considering purchase of all or part of the Banks as a new national wildlife refuge. This was not the first time that the Department of the Interior had expressed interest in the area. The Back Bay National Wildlife Refuge, six miles to the north, had been established in 1938. The nation's first National Seashore had been established at Cape Hatteras, some thirty miles to the south, in 1956. And in 1964, Secretary of the Interior Stewart Udall had suggested the idea of a Currituck Banks National Seashore, an idea that received strong local opposition and a very quick death.

This time the interests of the Department of the Interior were generated by the demands of the State of Virginia that something be done to provide access to state parklands it had acquired between the Back Bay refuge and the state line.

The Whalehead Club in Corolla was established in the mid 19th century. Photo by Ellen Owens

This almost six-mile-long stretch of beach, False Cape State Park, had been acquired in the late 1960s at a cost of some $8.3 million. Despite a major study on providing access to this area (Howard, Needles, Tammen and Bergdoff, 1977), the Virginians had no way of getting people to the park. Access across the sound posed many environmental, financial, and practical problems, and the Department of the Interior remained adamant about forbidding a road through the Back Bay refuge. In response to Virginia's pressures for a road or a land swap, the Department of the Interior decided to perform a comprehensive analysis of wildlife protection needs from the Chesapeake Bay to Dare County, N.C.

The first product of this study, an environmental assessment laying out alternatives from no action to total acquisition, became public in March, 1979. The immediate response was loud and negative. Within two months there were press reports, generally accurate, of adamant opposition to any federal acquisition whatsoever on behalf of the county board, the governor, the Congressman for the district, and both of the state's Senators. The announcement of the Fish and Wildlife Service's conclusions to an unsuspecting and unconsulted local and state government very nearly led to the death of their proposal.

However, this time the idea was not summarily dismissed, as it had been in 1964 when Stewart Udall proposed it. In early 1979, in response to the access initiative, the state had established a comprehensive planning framework for addressing the future of the Currituck Banks.

The framework that was established in late 1978 and early 1979 evolved over several months and incorporated the ideas of a number of people. The central concept that developed was that there needed to be a comprehensive, equitable, implementable resolution of all the critical issues facing the Banks. This meant that all the key issues -- access, acquisition of nature preserves, the intensity and timing of development, public services for development, and so forth -- needed to be addressed simultaneously. It meant that all of the key parties and their interests would have to be considered at every step of the process.

One of the factors that made this framework viable in 1979, a factor that was missing in 1974, was the existence of a strong state coastal management program. This gave the state a standing policy-making group, the Coastal Resources Commission, that would provide a forum to start and maintain high-level discussion of the issues. It also made available to the state a core staff with the expertise and time to stay on top of the myriad issues that make up these complex resource management decisions. A number of other factors were essential in making the framework viable -- a strong governor interested in the issue, cabinet secretaries willing to devote both their personal time and staff re-

sources to the issue, the analytical capabilities and financial resources of the federal government, competent staff support for the county government, courageous political leadership in the county, and active participation of interest groups at critical times.

CARRYING OUT THE SECOND PLANNING EFFORT

The second attempt at planning the future of the Currituck Banks began in 1978 as the first stages of the state Department of Transportation (NCDOT) effort to provide access got underway. Recognizing the importance and complexity of the issue, state staff in the Office of Coastal Management began to collect as much information as possible on the Currituck Banks. This involved collecting and reviewing reports and studies, particularly those generated during the first planning effort, meeting with state and local officials involved in the earlier planning effort, and spending time on the Banks becoming familiar with the physical resources and the existing development.

The next step in putting the plan together was the formal establishment of a coordinating body, a group that could provide policy guidance in developing and implementing a state position on these issues.

The group first took the form of a joint committee with three members each from the Coastal Resources Commission (CRC), the Coastal Resources Advisory Council (CRAC), and the Marine Science Council (MSC). Staffing for the joint committee was to be provided by the Office of Coastal Management of the state Department of Natural Resources and Community Development (DNRCD). The committee was established following a joint meeting held between the three groups in January, 1979, to discuss a variety of issues, Currituck among them. The committee was initially formed to work with the county and NCDOT on the access issue. However, within several weeks of its creation, word of the acquisition study by the U.S. Fish and Wildlife Service (FWS) became public and the committee's charge was informally expanded to address this issue too.

The first order of business was to acquaint the committee with the full range of issues facing the Currituck Banks, so the first meeting was held in Currituck County in February, 1979. It consisted of a field trip to the Banks followed by a day-long meeting attended by all the key parties interested in the issue. The county board, the Fish and Wildlife Service, each of the developers and major land-owners, each of the conservation groups, and representatives of the permanent residents presented their stories to the committee. This served both to gather essential facts and to acquaint the committee with some of the underlying conflicts of values and interests. The county laid out facts on tax revenues from the Banks, past and present policies on Banks development, and a general sentiment favoring public access and opposing acquisition of a refuge. FWS laid out the history of the acquisition and use of the Back Bay refuge, the time-table for their study of wildlife protection needs in the general area (later to become the acquisition proposal), and their general policies of allowing only wildlife activities in refuges. Each of the two major developers presented detailed information on their subdivisions (number of lots, lots sold, number of acres in open space, service provided, etc.) and their respective conflicting positions on the necessity of providing public utilities and the desirability of public access. Not surprisingly, the developer with a "clustered subdivision" already having central water and sewer and guaranteed access to the south (Coastland Corporation) favored requiring public utilities and opposed public access. Similarly, the developer with five grid subdivisions having individual wells and septic tanks and very limited guaranteed access (Kabler and Riggs) opposed any requirement for utilities and favored immediate provision of public access. The latter point was particularly important to both in that, based on a cost-sharing agreement keyed to the number of lots sold, Kabler and Riggs were paying 76 per cent of the cost of maintaining the private road to Corolla.

Photo by Ocracoke Photographer, Ann Ehrinahaus

The committee's second meeting was held in April, 1979, with the top officials of NCDOT to discuss their access planning process. Representatives of both the county and environmental groups were invited to attend. This meeting served to educate all participants on the details of the access alternatives and studies underway.

Later that spring, however, it appeared that the framework for planning -- securing a comprehensive, equitable, and feasible resolution of all the key issues concurrently -- was going to break down before it had a chance to get started. This possibility, which of course remained throughout the planning effort, was reflected in several events related to the in-

troduction of the acquisition proposal by the FWS. In late March, the governor, while not taking any formal position, publicly indicated sympathy with local opposition to acquisition. In April, the county indicated that it was adamantly opposed to acquisition. Over three hundred people attended a FWS meeting in the county in early May, most expressing strong opposition to the purchase. By late May, fourteen members of the North Carolina and Virginia Congressional delegation voiced opposition to purchase. In early June, the North Carolina General Assembly passed a resolution requesting a referendum in the county before any federal acquisition would take place. In sum, it looked like one of the major potential pieces of a comprehensive resolution of the issue -- acquisition of some additional part of the Banks to protect its natural character -- would be rejected before it could be seriously considered.

Also, in April, a second Currituck committee had been formed, a bi-state committee to address the common concerns of North Carolina and Virginia relative to Currituck. It initially appeared that a second committee would further fragment a somewhat tenuously held together situation, perhaps even competing with the joint CRC-CRAC-MSC committee for turf on the Currituck issue. This proved to not be the case, in part because there was a substantial overlap in the membership of the two committees and both were staffed by the state Office of Coastal Management.

Several factors were already at work behind the scenes to prevent a breakdown of the comprehensive framework. First, and perhaps most important, was the existence of the joint committee. This was a group of prominent coastal policy makers urging a comprehensive resolution and opposing precipitous decisions on any of the individual issues, including acquisition of a refuge. Second, since early 1979 the state staff had been discussing with the county the idea of performing a detailed fiscal analysis of the Outer Banks development to determine to what extent the projected tax revenues would be offset by public service costs. In June, 1979, the state made a special $6,000 grant to the county to have the study done as the first step in updating the county land use plan. Third, given the clear opposition to their proposals and a strong reprimand from the governor, the FWS decided by early summer to work more closely with the state and the county in future development of their acquisition proposal. Finally, several citizen groups had formed to provide forceful public input into the process. One such group, the Outer Banks Civic League, was composed primarily of lot owners opposed to acquisition and favored access. A second, the Friends of Currituck, was composed of prominent environmentalists and strongly urged a comprehensive resolution with careful study of each option. The Friends of Currituck, co-chaired by Currituck native Jerry Wright and former N.C. State University Chancellor John Caldwell, played a very active role within North Carolina. The close monitoring and day-to-day involvement by the director of the group, Carrboro attorney John Curry, was particularly important.

Several events in the summer of 1979 helped to consolidate the comprehensive approach to resolving the Currituck Banks issues. First, the bi-state committee met in mid-June to tour the area, convene a highly publicized meeting to exchange views, and conduct a public meeting to hear citizen opinions. This was important in that it got a number of additional high-level policy makers -- cabinet secretaries and state legislators --personally involved and committed to a comprehensive resolution. Second, the joint committee met in July and adopted a set of preliminary recommendations that were submitted to the Governor. These recommendations were that the scheduled December 31, 1979 terminatior of all access along the Back Bay beach be post-

"...IN RESPONSE TO THE ACCESS INITIATIVE, THE STATE HAD ESTABLISHED A FRAMEWORK FOR ADDRESSING THE FUTURE OF THE CURRITUCK BANKS."

poned pending a comprehensive resolution of the Currituck Banks issues; that a final decision on FWS acquisition be delayed to coordinate it with the county land use plan update and other key parts of the planning effort; that an east-west access be the preferred access route, any road from the south being only a tempor ry access; and a full economic, engineering, and environmental study of the access alternatives be immediately undertaken by NCDOT. This action, apart from the substance of the recommendations, was important in two respects. It enhanced the committee's credibility with all parties by evidencing their willingness to take a stand and communicate with the Governor, and it put the committee firmly behind the concept of a comprehensive resolution. The bi-state committee, meeting later in July, generally endorsed these recommendations.

The most serious challenge to the comprehensive framework for resolution arose in August of 1979, when the NCDOT staff proposed to recommend that the Board of Transportation immediately resolve the access issue by establishing a public road to Corolla without first doing an environmental impact statement. It appeared that access to the Banks, the single most important factor in determining its development, would be handled as just another routine road decision. This proposed recommendation was largely based on the staff's perception that the Governor still wanted the quick answer on access he had requested in 1978. The reaction to this proposal was quick and effective. The joint commit-

tee, meeting in late August, sharply reminded the NCDOT of the need for consultation and coordinated action. Perhaps more importantly, the Friends of Currituck, the Audubon Society, and other environmental groups undertook a major letter-writing campaign to the Governor requesting an environmental impact statement prior to an access decision. The Governor and NCDOT staff got the message. On September 14, 1979, the Board of Transportation accepted a staff recommendation to authorize a full impact statement on access to the Currituck Banks and to postpone a decision on access until after receiving that report in late 1980 or early 1981. This was a critical decision. If the state had proceeded immediately with the road, the comprehensive framework might well have collapsed, leaving the Currituck plan on paper with the development decision made as a low-visibility public investment choice.

The county's fiscal impact analysis was completed in October, 1979 and had a major impact on the county board's attitude towards potential acquisition of a refuge. The report (Roberts and Eichler Associates, Inc., 1979) concluded that of the Outer Banks development alternatives studies, one involving FWS acquisition of the lands north of Corolla and development of lands south of Corolla would be the most advantageous to the county financially. This confirmed what many had suspected -- that,

"THIS REPORT SUBSTANTIALLY REMOVED ONE OF THE COUNTY'S PRINCIPAL OBJECTIONS TO ACQUISITION, THE LOSS OF TAX BASE..."

while substantial tax revenues would be generated, the public costs of providing water, sewer, police, fire, and educational services would be almost as high if not higher than the taxes collected. Alternatively, if a refuge were acquired, FWS would make payments in lieu of taxes, thus providing some revenues, while the public service costs would be minimal. This report substantially removed one of the county's principal objections to acquisition, the loss of tax base, and created a climate wherein the county could seriously consider endorsing acquisition as part of a comprehensive resolution. With this report and additional grants in hand, the county in October began a comprehensive updating of their land use plan.

Following a meeting with state and county staff in November, 1979, the FWS agreed to extend access permits along the Back Bay refuge beach to permanent residents of the Currituck Banks past the scheduled December 31 termination date. While affecting a relatively small number of people, this compromise by FWS on a very emotional issue greatly contributed to the cooperative spirit that was developing.

The first major element of a comprehensive resolution -- the acquisition of part of the Banks as a wildlife preserve -- was ready for review at the beginning of 1980. The draft environmental impact statement (DEIS) on a proposed refuge on the Currituck Banks was issued by FWS in late December, 1979, with a comment period running to April 1, 1980. The DEIS laid out several detailed alternatives, with the preferred option being acquisition of all lands north of Corolla and the wetlands south of Corolla to the Dare County line. The DEIS estimated the cost of this acquisition to be on the order of $100 million, which would be the most expensive single refuge expenditure ever made by FWS.

The state's two committees on Currituck met in mid-January to propose a merger into a single Currituck Banks Advisory Committee (CBAC). By combining membership, the committee would have representatives of the CRC, CRAC, MSC, NCDOT, DNRCD, Currituck County, and citizen members from the county. The new committee agreed that its role would be to provide policy advice and coordination as to the state position on a comprehensive resolution of the Currituck Banks issues.

The review of the DEIS by the county and the CBAC was quite detailed. It became clear in discussions and in the public hearings that were held in late February that there were several key reservations regarding the proposal.

In the late 1970s development began in several subdivisions on the Currituck Banks.
Photo by David Owens

There were concerns about the uncertainty of payments in lieu of taxes, about continued hunting and fishing rights in waters adjacent to the refuge, about the availability of beach recreation in the refuge, and about residents in the acquisition area being treated fairly. Therefore, the county and state staffs met with FWS in early March to request additional clarifications on these concerns, resulting in a letter to Governor Hunt in mid-March from FWS officials in Washington, D.C., providing needed additional information and assurances on key points.

After several months of careful work and deliberation, the county and state took key positions on the DEIS, the first piece of a comprehensive resolution. As part of the local land use planning effort, the county had established a land use committee to work with professional planning consultants (there still being no in-house planner). The committee reviewed additional fiscal analyses and carefully looked at the environmental and sociological impacts of development on the Banks. The committee concluded that the county should conditionally support acquisition. On March 17 the Currituck County Board of Commissioners agreed by a vote of three to one, to conditionally endorse acquisition. The conditions of county approval reflected the concerns noted above and were conditions that,FWS had indicated in their letter to the Governor,would be accepted. On March 19, the CBAC, by a vote of ten to one, recommended that the state similarly endorse the proposed acquisition.

These positions reflected a compromise of the parties involved as to an appropriate future for the Currituck Banks. The northern half would be preserved in its natural state through acquisition as a new wildlife refuge. The southern half would contain residential development, with the wetlands acquired to protect the Sound, and regulations enforced to provide for oceanfront setbacks, dune protection, and appropriate septic systems. A public recreation area would be provided at a midpoint in the county to assure a buffer area between development and the refuge and to provide guaranteed local beach access and use.

In the five months following these actions, considerable state and county staff time was spent making sure that FWS fully understood the state and county concerns and would incorporate them into the revised acquisition proposal, to be issued as a final environmental impact statement (FEIS). Tasks included keeping the state Congressional delegation fully informed of the progress of these discussions, as the Congressman for the district and both Senators had indicated they would support the state and county's positions. The work was successful in that the FEIS, issued August 28, 1980, affirmatively addressed each of the qualifications raised by the state and the county. Therefore, the CBAC and the county board endorsed the proposed acquisition in September, 1980. The county board formally adopted their updated land use plan, which incorporated approval of the acquisition proposal, in October. The governor officially made the approval of acquisition the state's position in November, 1980.

It is clear that the comprehensive resolution that was the objective of this second major planning effort has not yet been achieved, much less implemented. The refuge acquisition proposal still faces Congressional approval and appropriations. Even with state and county support, appropriations of this magnitude (as much as $20 million per year for five years) are difficult to obtain. Also, at Senator Jesse Helms' request, the U.S. General Accounting Office is performing a detailed audit of the refuge proposal and negative comments by GAO could affect funding prospects. The NCDOT impact study on access alternatives, scheduled for completion in early 1981, leaves the second major issue unresolved -- securing adequate public access to that portion of the Banks that will be developed. The county land use plan, which addresses the issues of density of development, required services, beach access, hurricane evacuation, and the like faces CRC approval and local implementation. Still the framework for a comprehensive, equitable, and feasible resolution of the issues has been firmly set in place and the initial results are quite promising.

CONCLUSIONS

Determining the future of the Currituck Outer Banks is the type of complex natural resource management issue that is increasingly facing planners and managers in the United States. In order for these decisions to be made in a rational and equitable fashion, the past and on-going experience with the Currituck Banks suggests several lessons. First, there must be a degree of central management of the decision-making process. In issues this complex there can never be central control of the entire situation, but there must be someone to coordinate and focus activities as much as possible. The key actors who will influence or control individual decisions must be identified and involved. All the overlapping issues must be identified and coordinated. Management of the process, a role played by the Office of Coastal Management on this issue, is an appropriate role for planners. Second, critical information necessary for informed decisions must be obtained and presented to key decision-makers. The fiscal impact study prepared for the county board is an example of this. However, the planners providing this information must recognize that it is usually impossible to obtain all the information that is desirable, and yet they cannot allow this

fact to paralyze the decision-making process. Also, the best information is worthless if it is not available at the right time or is not presented in such a way that it can be understood. Third, planners must recognize that these types of issues involve basic governmental policy choices, which are, almost by definition, political choices. The planner who does not recognize and deal with this can not successfully manage this type of planning process. In this situation, choices on whether to immediately proceed with the building of a road, whether to oppose or cooperate with FWS, indeed, whether to deal with the issues at all, were ultimately made by politicians. Fourth, a close tie must be maintained between the planning concepts and the realities of practical implementation. There must be realistic appraisals of the costs of implementation, of what is politically acceptable, of the staff needs for the planning process, of the long periods of time needed to develop and carry out solutions, and of the full range of points that influence whether the decisions reached can be carried out. In this case the comprehensive resolution meets these tests, and it is recognized that several additional years of work will be needed to implement the choices made.

NOTES

[1]Access along the beach was first restricted in 1970. The restrictions were upheld in a federal court challenge, *Coupland v. Morton*, Civil No. 145-73-W (E.D. Va., February 26, 1975).

[2]The North Carolina legislature has twice enacted laws authorizing construction of a toll turnpike along the Currituck Banks. The first, passed in 1948, was found unconstitutional as an improper delegation of legislature authority to the turnpike board. *Carolina-Virginia Coastal Highway v. Coastal Turnpike Authority* 237 N.C. 52, 74 S.E.2d 310 (1953). The second, passed in 1965, was upheld in the courts, *North Carolina Turnpike Authority v. Pine Island, Inc.*, 265 N.C. 109, 143 S.E.2d 319 (1965), but no serious effort was made to build the road.

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Book Review

Refining the Waterfront, Alternative Energy Facility Siting Policies for Urban Coastal Areas. David Morell and Grace Singer, et. al. Oelgeschlager, Gunn & Hain, Publishers, Inc., Cambridge, Massachusetts, 1980. 309 pages. $22.50.

Another conflict in a long line of officially recognized, but yet to be manifested, conflicting demands on our beleaguered coasts has come to the forefront: it is one between the growing interest in and revitalization of neglected urban waterfronts and the need to site a number of new energy facilities; many of them built or predicted in conjunction with Outer Continental oil and gas recovery. The conflict may be the greatest in the northeast; because the northeast is the major market for energy in the eastern United States, it is the region most often preferred for energy facility siting. However, there are quite a few factors, Coastal Zone Management policies among them, which direct development away from pristine or natural areas. As corporations attempt to locate energy facilities in northeastern urban areas, they are more and more unsuccessful--turned away by the efforts of the city's and region's citizens, newly interested in the possibilities and promises of their rediscovered waterfronts. David Morell and Grace Singer, principal authors of *Refining the Waterfront, Alternative Energy Facility Siting Policies for Urban Coastal Areas*, are convinced that siting strategies "could support, rather than contradict, the innovative redevelopment efforts now underway in many urban waterfronts." (p. 285) They maintain that an energy facility siting strategy must be made compatible with three "critical national priorities:" greater energy self sufficiency, urban revitalization, and protection of fragile rural coastlines.

Their book is a group effort; it is an attempt to forge a convergence of the research of several consulting firms and individuals on the issues raised by these conflicts, and, ultimately, on devising a means of resolution. Unfortunately, the book suffers somewhat from this format. The attempt at convergence is not quite successful; there is a lack of cohesiveness. *Refining the Waterfront* is more than a collection of articles which just happen to deal with similar or related topics; but it is not a collaborative effort either, as it seems that the only two authors who had a clear conception of the volume as a whole are Morell and Singer. Had Morell and Singer woven stronger ties both between the separately-authored chapters and between the chapters and the objectives and conclusions of the book, the book might have been a more cohesive effort. Instead there is a lack of clearly stated purpose and direction. The principle authors do state broad objectives several different ways, but they are primarily to "determine mechanisms for finding sites for necessary new energy facilities that are compatible with the conflicting mandates of rural coastline preservation and the changing uses of urban waterfronts." (p. 2) This is an end point towards which the research is directed, but Morell and Singer do not adequately explain how the research they have commissioned aids in building towards their objectives.

Although both the title and the feeling transmitted throughout the Introduction stress "alternative" siting policies, the bulk of the volume is spent on explanations of the status quo. It is divided into four major parts, two of which are comprised almost entirely of case studies, surveys, and discussions of current siting concerns and issues. This is valuable and necessary background information, but the thoroughness of its coverage seems, in this case, to be somewhat at the expense of analysis and conclusions as to what this information can contribute to the formulation of alternative siting policies.

The first two sections of the book deal with, respectively, siting issues on the "older urban coast," and those on the Gulf

coast which represents an area of vast undeveloped coastline in sharp contrast to the northeastern urban coast. The issues involved in siting energy facilities differ considerably between the two types of coastal areas.

Singer's contribution to the first section is a well-written chapter on the reasons behind the successful rejection of five proposed facilities in five years in Hudson County, New Jersey. She includes valuable and thorough research into attitudes of the citizen activists responsible for rejecting the proposed facilities. There are no prefacing or concluding remarks to the first section, but closely read some primary issues emerge as important in facility siting on an older urban coast. The issues include public opposition growing in size and strength to the siting of such facilities, largely due to an increasing and renewed pride in revitalized urban waterfront areas; lack of space for these facilities, as many cities have already begun to turn previously vacant waterfront into parks and public access corridors; and lack of a base air quality sufficiently low to allow addition of often heavily polluting energy facilities. Most of the urban areas on the east coast are in fact "nonattainment" areas; they do not expect to reach levels of air quality mandated by the Clean Air Act by the date required.

Resource and Planning Consultants, Inc., wrote the three chapters which comprise Section II. Two of these chapters are descriptive case studies of siting on the Louisiana and Texas Gulf coasts, and the third is a discussion of the policy implications and regional distinctions highlighted by the case studies in contrast to those in Section I. Although, as mentioned previously, many corporations would prefer to locate their facilities on the northeast coast since that is where the greater part of their market is, all other factors tip the balance in favor of locating on the Gulf Coast. There is more land available, there are seldom any air quality constraints, and, perhaps most important, the people of this area welcome the facilities. As the authors sum it up, "In other areas of the country where the environment is approaching its absorptive capacity for further development, thus leading to increasingly adverse conflicts, residents analyze specific impacts to weigh the benefits associated with a particular facility. The people of Texas and Louisiana have not reached this point." (p. 175) They go on to caution, however, that perhaps the time when the people of these states do reach this point is not so far in the future.

The book's third major section is a corporate perspective of the economics involved in energy facility siting. It is written by another consulting firm--Energy and Environment Analysis, Inc., who obtained the "corporate perspective" through interviews and surveys. The overall intent of the section is to "determine if the additional costs of innovative siting can be offset by reducing permit costs." (p. 183) The authors see two issues important to the extensive economic analysis which makes up much of these chapters: the economic impacts of the desirability of an investment in an energy facility, and the effect of the location selected for the facility on the permit process, thus on the investment economics. One particularly valuable chapter is devoted to the issue of location selection, specifically the choices between coastal vs. inland and urban vs. rural siting. The chapter discusses the advantages and disadvantages of siting in each location, as derived from interviews with companies that had proposed coastal refineries. This is a long and detailed section. The questions it sets out to answer are very important to the overall objectives of the book, and there is a wealth of information and discussion included with which to address these questions. However, like the book itself, the section lacks both a clear statement as to how the analysis presented addresses the vital questions posed and an adequate conclusion. Much of the material is lost to the reader through confusion as to how all the findings and scenarios fit together, or where they lead. Many of the conclusions and implications of these three sections do surface in the final chapter, in the guise of policy recommendations. Some sort of purposive or concluding statement would, nevertheless, be helpful.

The final section includes two chapters. One is, finally, an exploration of five alternative energy technologies which might, by requiring less land area and producing less pollution, be more appropriate for energy production within the urban coastal zone. The inclusion of a focus on alternative technologies is a valuable addition to the focus on alternative siting methods. Linda Kirschner, its author, does a good job of describing the technologies and discussing the problems--largely institutional--that will likely occur in any attempt at widespread implementation of these alternatives.

The final chapter is a list of forty policy recommendations based on the concepts and findings illuminated by the preceding research. They are designed, says Morell, "to alter the existing situation in which proposed new energy facilities often contradict with urban coastal revitalization." (p. 285) These "policy recommendations" do not always take that form. Some are statements of value: "In many economically depressed American urban centers, efforts at innovative redevelopment of vacant or poorly utilized land on or near the waterfront are the prinicipal positive signs in a rather bleak over all situation."

(p. 290) Others--in fact, many--are statements of fact: "Some alternative energy technologies provide the opportunity to reduce siting tensions in urban areas by incorporating development and energy systems in tandem efforts at the same location." (p. 293) And still others are indeed recommendations, containing such words as "should" and "must." This chapter constitutes a reasonably complete summary and concluding statement for the rest of the book. It is, however, comparatively brief. It seems somehow regrettably unbalanced that so little time and space is spent in attempting to draw conclusions and implications from the large volume of information presented.

Refining the Waterfront is a timely book. It addresses a crucial conflict which is still in the early stages but which can only get more intense, and as such is potentially valuable to anyone involved in environmental, coastal, or energy planning. It is packed with information and insights derived from a thorough study of experiences with these conflicts. There are, in fact, a number of fertile ideas scattered throughout the chapters which become lost in the sheer volume of information presented. One such idea is that of regional waterfront planning. A chapter by Peter Denitz in the first section of the book explores some attitudes toward this concept and discusses some of its possibilities. This thread, however, is never again picked up in the rest of the book, even in the final section on policy recommendations, which concentrate on the balancing of local, state, and federal interests, recommendations on "Government Institutions and Public Participation in Energy Facility Siting."

The lack of a clearly drawn line between the many facts and concepts presented throughout the book and the final "Policy Recommendations" is a flaw that has already been discussed. Because of this deficiency, the burden falls on the final chapter to fulfill a number of functions: it must be a summary, an interpretation, and a conclusion in addition to its proposed role of advancing policy recommendations. Though these "recommendations" do comprise, as mentioned, a sort of summary in list form of most of the book's content and a sort of discussion and conclusion as to the import of these contents, the chapter falls short on several counts. First, a few seemingly important concepts found earlier in the book do not reappear. More important, though they are sound and well thought out, the recommendations are a bit tame and perhaps slightly too vague as to how they are to be implemented. Most of the ideas presented are difficult to argue with, but this works two ways. On one hand, it may make them more palatable and thus more likely to be heeded and perhaps worked into coastal zone management programs or energy policy. On the other hand, a question remains as to whether changes in the functions of existing agencies and admonitions to consider additional factors will be enough to meet the challenges of major conflicts such as those presented by the authors.

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